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Australian Personal Computer

AUSTRALIA'S LEADING COMPUTER MAGAZINE

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FEATURES

- **Can I get that in lilac?**
The future of PC design
- **Make mine mobile**
Third-generation technologies explained

FIRST TAKE

- **New Linux distributions compared**
Red Hat, SuSE and Open Linux duke it out
- **Submit your tax online**
ATO e-tax
- **The chipset challenger**
Intel 810 motherboards
- **Storage at speed?**
ATA/66 drives
- **Video capture**
Pinnacle card

WORKSHOP

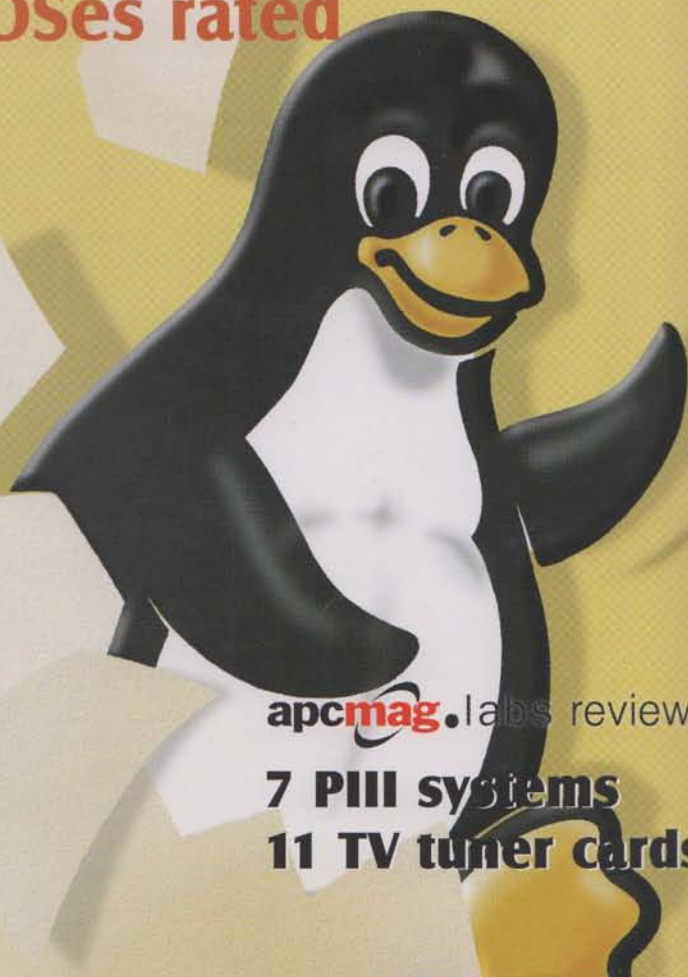
- **Win 98 as a Web server**
- **Getting to know Gnome**
- **Tips for buying second-hand**
- **Plus C++, Java and more**

ON THIS MONTH'S SOFTWARE-PACKED CDs

- **Essential OS updates**
Windows, Mac and Linux updates and utilities
- **Windows clean install kit**
- **Top 50 shareware games**
- **20 TV desktop themes**
- **160 programs for Windows, Mac and Linux**

Is Windows CRACKING?

Top desktop OSes rated



apcmag.labs reviews

7 PIII systems

11 TV tuner cards

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- 16MB Diamond Viper TNT AGP Graphics Card
- Integrated Yamaha 64 Voice WaveTable Sound
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- Integrated Creative Labs 64Voice Sound
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- 15" Colour Monitor (13.7" v.i.s.)
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- Integrated Creative Labs 64Voice Sound
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- 24X Max* Variable CD-ROM Drive
- 14.1" XGA Colour TFT Display

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- 24X Max* Variable CD-ROM Drive
- High-fidelity Audio SoundBlaster Compatible
- Microsoft® Windows® 98
- Microsoft® OEM Works Suite 99
- 56K Data/Fax Modem (V.90 Compliant)
- Deluxe Carrying Case

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 - 4X Max* Variable DVD-ROM Drive and MARGI Decoder Card \$477
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- High-fidelity Audio SoundBlaster Compatible
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- Microsoft® OEM Works Suite 99

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- 32X Max* Variable EIDE CD-ROM Drive
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 - 64MB 100MHz SDRAM with ECC \$191
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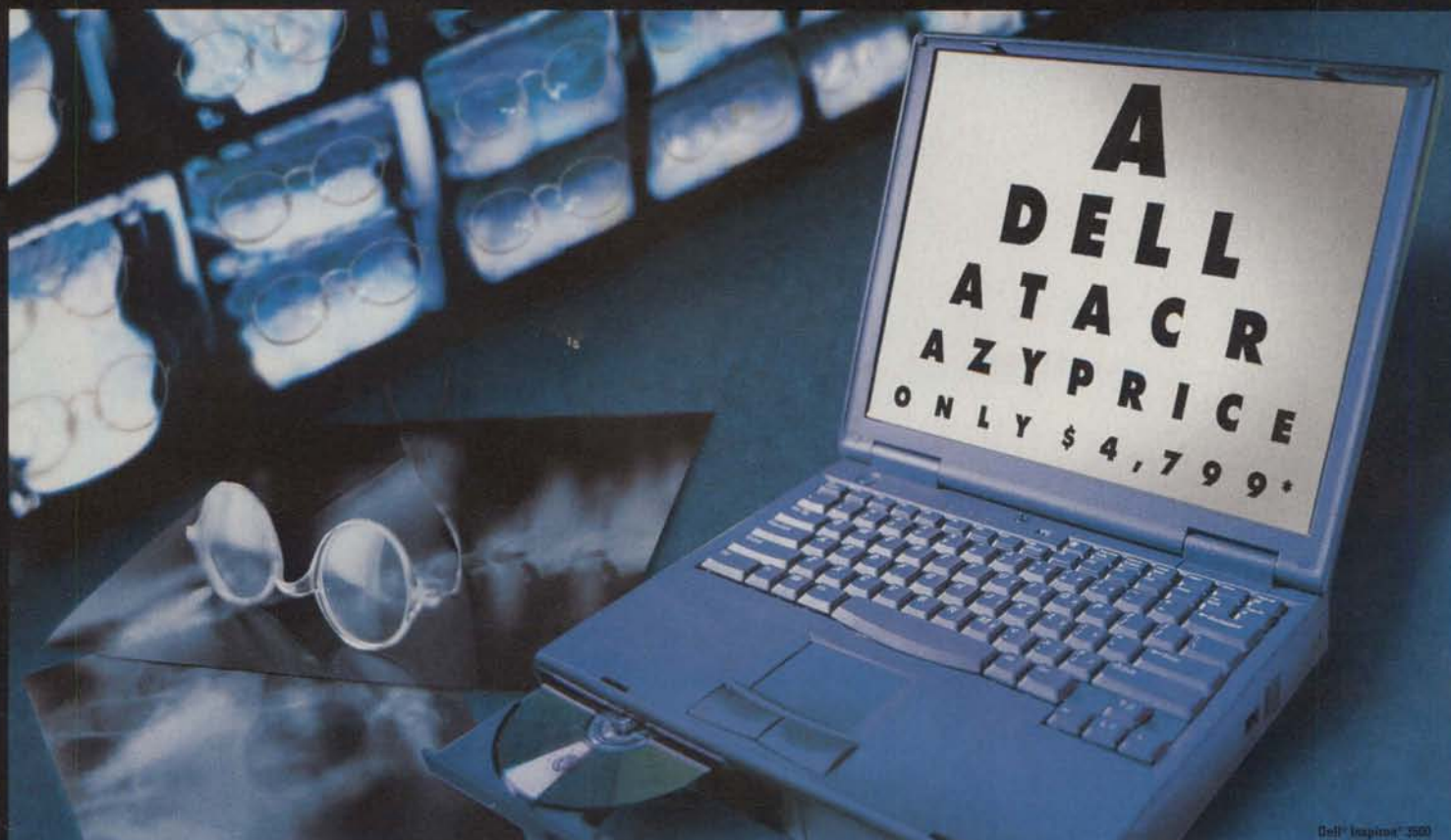
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- 3.5" 1.44MB Diskette Drive
- 3Com® 10/100 PCMCIA Ethernet Card
- 256-bit Graphics Accelerator
- High-fidelity Audio SoundBlaster Compatible
- 24X Max* Variable CD-ROM Drive
- 14.1" XGA Colour TFT Display
- Microsoft® Windows® 98
- Microsoft® OEM Office 97 Small Business Edition* (Ask your sales rep about our free upgrade to Microsoft® Office 2000)
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- 3.5" 1.44MB Diskette Drive
- 3Com® 10/100 PCMCIA Ethernet Card
- 256-bit Graphics Accelerator
- High-fidelity Audio SoundBlaster Compatible
- 24X Max* Variable CD-ROM Drive
- 14.1" XGA Colour TFT Display
- Microsoft® Windows® 98
- Microsoft® OEM Office 97 Small Business Edition* (Ask your sales rep about our free upgrade to Microsoft® Office 2000)
- 56K Data/Fax Modem (V.90 Compliant)
- 1 Year Limited Warranty
- Free Lifetime Telephone Technical Support

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
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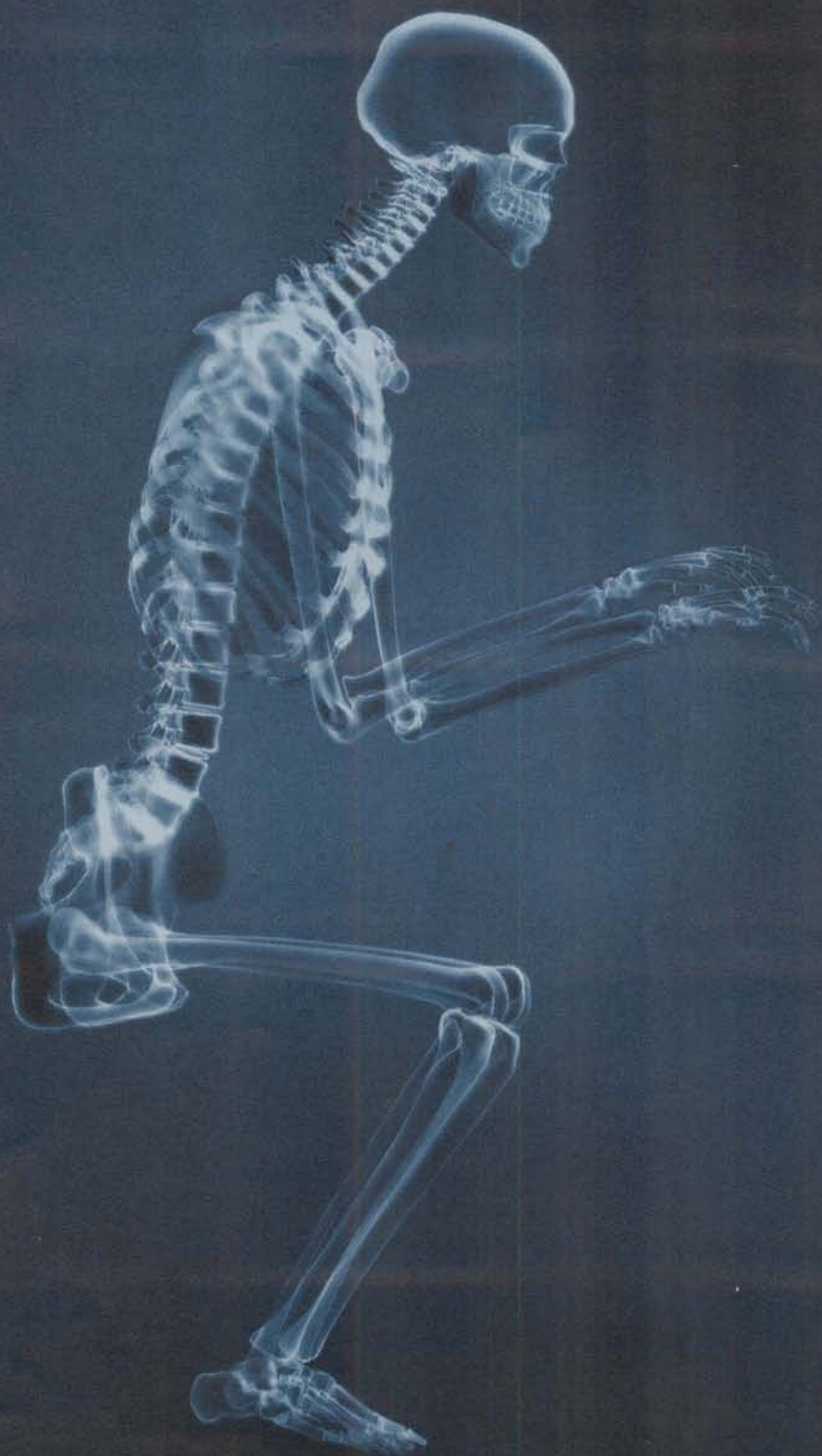
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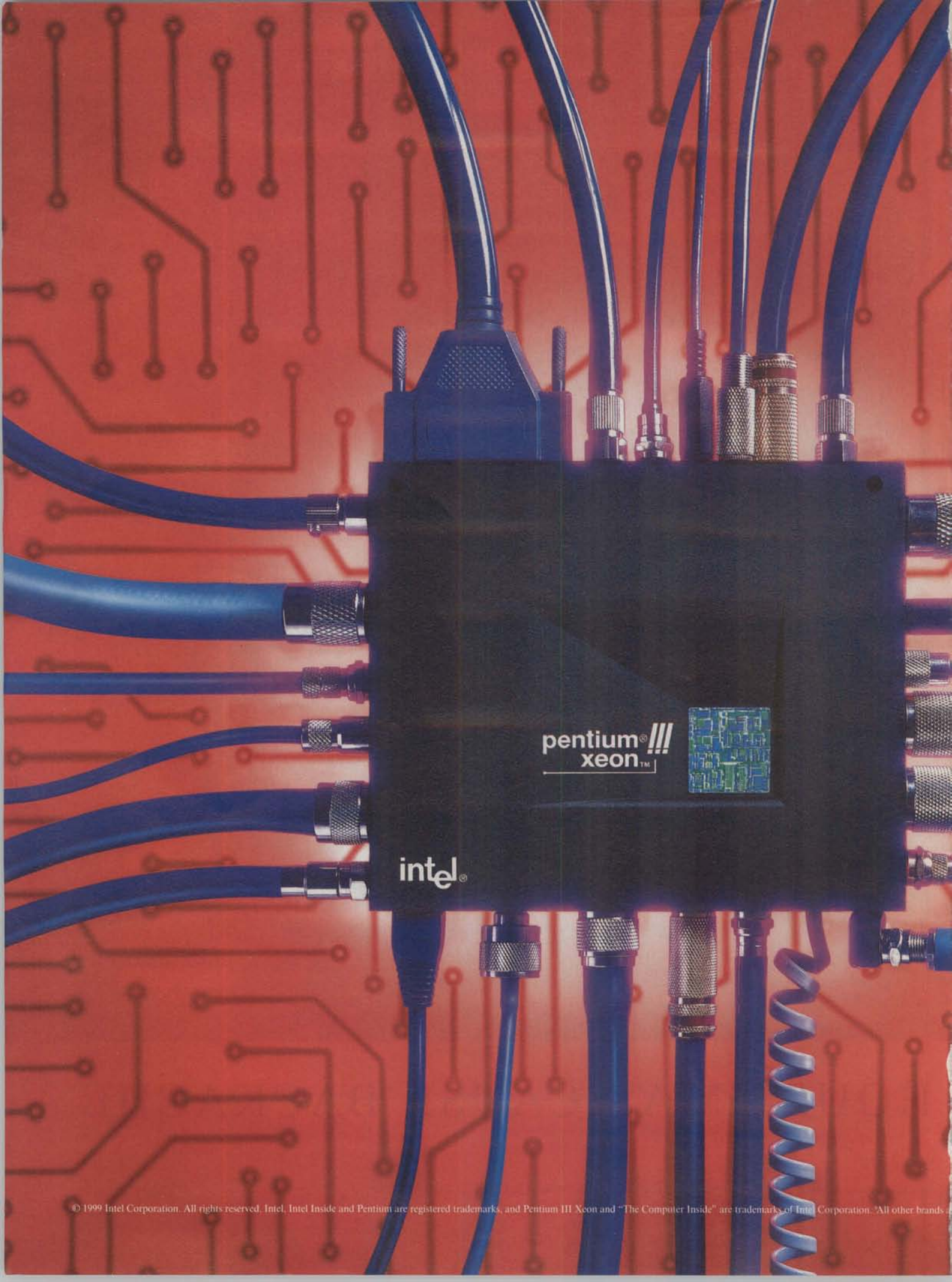
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EDITOR'S NOTE



Free market share

As I was minding my own business while commuting one morning last month, a GYT (glamorous young thing) offered me a glossy brochure and said "free Internet". Because I was barely awake I declined the opportunity to learn more about this doubtless exciting concept. The prospect of 'free Internet' at that stage of the day was about as feasible as 'free beer', the reality of which is invariably somewhat disappointing.

I later surmised that the GYT's (there was definitely more than one) distributing 'free Internet' must have had some sort of corporate backing. Either that or they were in the market to 'free the Internet' from what they saw as the shackles of the proposed Federal Government Internet censorship initiative, or Broadcasting Services Amendment (Online Services) Bill 1999 as it is known. Unlikely.

Curiosity got the better of me the following week when the GYT's reappeared and I snaffled a brochure. In the interim I'd thought this could all be about some sort of 'buy some Internet access, get some Internet access free' deal. Or a 'buy a mobile phone and get some Internet access free' deal. Or — yes, there's always a faint possibility — a corporation offering free Internet access because it's a nice corporation.

Curiously, it appeared closest to the latter. 'Free Internet' apparently meant — as near as I could tell — five hours free Internet access every month, with no joining fees and no download limits. Additional hours used cost \$1 each. The company was EISA. As reported by APC's **NewsWire** IT news service in May (see <http://newswire.com.au/9905/freenet.htm>), EISA is hoping the bulk of people taking up this offer extend their monthly usage to about 15 hours. Even if they don't, it shouldn't cost too much to give away those hours.

Still, it sounds like a tough way to make a buck, and further proof of the competitiveness of the local ISP scene, which has become a mix of consolidation and expansion. Hopefully this attempt at expansion won't lead to some consolidation.

Steven Fear

Contents

FIRST TAKE

Linux distributions compared



How do Red Hat 6.0, OpenLinux 2.2 and SuSE 6.1 stack up in a head-to-head battle? 34

HARD DRIVES

Ultra ATA/66 32

PC EMULATOR

VMware for Linux 38

NOTEBOOK

IBM ThinkPad 570 40

CHIPSET

Intel 810 motherboards 42

VIDEO CAPTURE

Pinnacle Studio DC10 Plus 44

DIGITAL CAMERA

Nikon Coolpix 950 44

Submit your tax online

This year, taxpayers will be able to send their own returns directly from their PCs for the first time. APC puts the brand new e-tax system through its paces. 30



NEWSWIRE

| | |
|-----------------------------------|----|
| The Net censorship reality | 19 |
| Cabletron's Net crisis | 19 |
| GST under control, says vendor | 22 |
| Datacasting tests begin in August | 22 |
| News Roundup | 22 |
| Sausage snags lucrative deals | 24 |
| Cashbook | 24 |

NEWS ANALYSIS

| | |
|--------------------------------|----|
| TIO's registration tangle | 26 |
| Net enthusiasm waxes and wanes | 28 |





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The screens of AcerView Professional series monitors are clearly ahead in the market.

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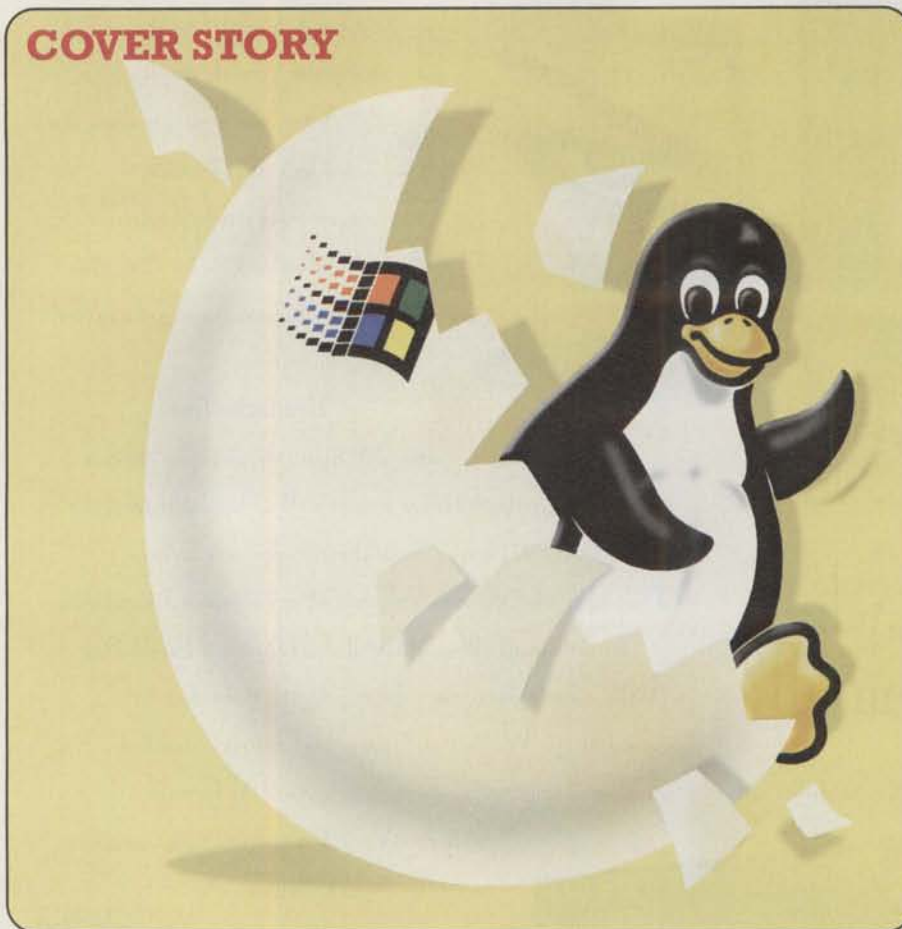
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COVER STORY



Is Windows cracking?

Windows in its various flavours has long been the dominant operating system for desktop PCs, but is it the best choice for you? The Mac has always provided stiff competition in the ease-of-use department, Linux is moving away from its command line origins with new operating environments and simpler installation, and BeOS is setting new benchmarks for stability and power.

In this special feature, APC rates these major desktop OS contenders and looks at which one is right for you.

94

APC's annual Service & Reliability survey

'I will never buy that brand again.' Australian PC buyers have always had strong reactions to poor service and dodgy equipment. Our annual reader survey identifies those companies which are striving to improve service and quality — and those which aren't hitting the mark.

82



REVIEWS

Pentium III goes to Hollywood

Intel's advertising for the Pentium III promised it would make the Internet faster. Does it deliver on that promise, do games and business apps get a similar boost, and is it worth the hassle of upgrading? APC Labs tests out seven Pentium III systems.

119



Editor's Choice 122
Results and specifications 126

Products in this review:

- Adelong Advantage Pro MP450
- Beyond Computers SuperO Velocity 500MHz
- Dell Dimension XPS T550
- Edge KTX Premium Quicksilver PIII 450 MD-L
- Gateway Performance 550
- Hewlett-Packard Vectra VLI8
- Peripherals Plus Pentium III 450

Tuning in

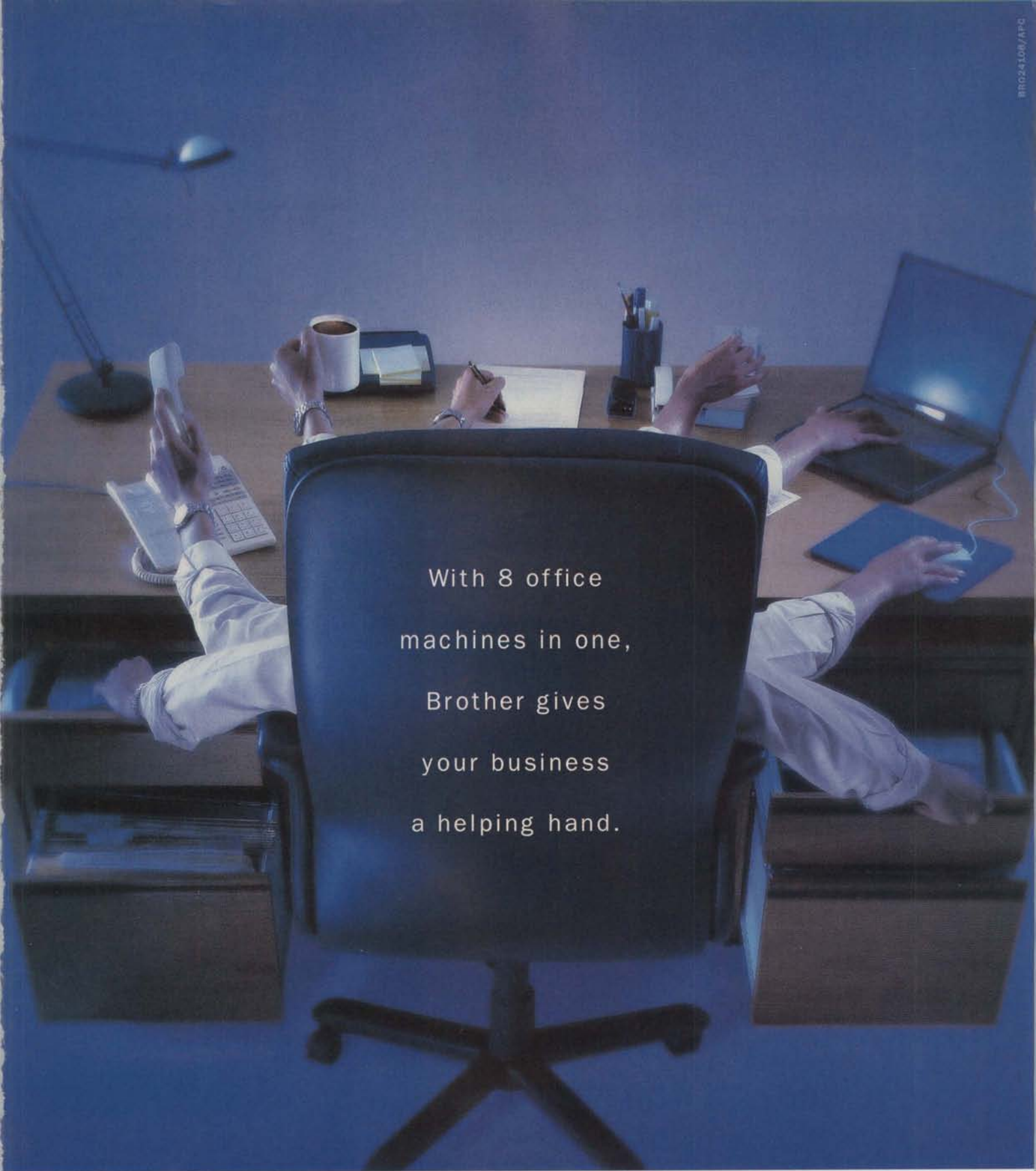
A great way to get free entertainment on your PC is with a TV tuner card. APC Labs tests 11 products that offer this accessible desktop option.

130

Results and specifications 134
Editor's choice 136

Products in this review:

- Dynalink MagicTVView
- Genius Video Wonder/Pro II V2
- Hauppauge WinTV-primio
- Hauppauge WinTV-radio
- Integrated Micro Solutions TurboTV
- Lifeview FlyVideo TV
- Lifeview FlyVideo FMR
- Pinnacle miroVideo PCTV
- Pixelview PlayTVpro
- Spirit TV/Video Card
- Tekram CaptureTV M250



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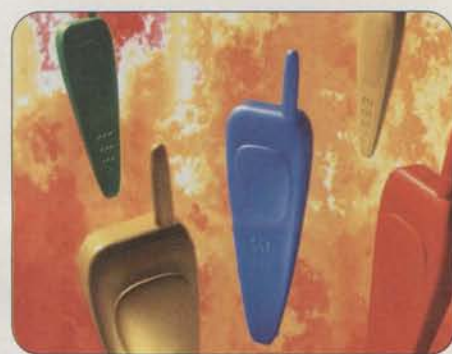
Design of the times

We've been promised new-look PCs for most of this decade, but at long last the predictions seem to be coming true. Welcome to a world where your computer comes in a range of decorator colours, can operate from inside your sunglasses and is as useful in your kitchen as it is in your home office. 73



Third time lucky

Will third-generation mobile phone technology provide a single global standard, national coverage and, at last, the realisation of global roaming? Probably not — interoperability hasn't been the top priority for many of the companies hoping to profit from the new standards. However, emerging 3G concepts will change the way you think about and use your mobile phone. 109



Your next chipset

Intel is promising its next-generation chipsets, the 810 and 820, will revolutionise PC design. The new chipsets will integrate graphics, audio and modem functions, leading to a new generation of bargain PCs and bringing down prices for the average user. At the same time, speed-hungry tech-heads are waiting to see what the overclocking options will be on motherboards that integrate the new chipset. How do the 810 and 820 chipsets measure up to all these expectations? 114

FORUM

READERS' SAY 48

TWO BITS WORTH

Jeremy Horey: Software changes, just in time 54

Helen Dancer: What you can trade in for your privacy 56

Cathie Kennedy: Making the Web deliver for business 58

Price Watch: How parallel cables can catch you out 60

Service & Reliability: When you get stuffed around by vendors 62

Corporate: Aussie companies still learning outsourcing 66

Legal Ease: What happens when cybercrime gets nasty 68

Reprogramming: Building a Gateway to the future 70

CD CONTENTS 12

WEB CONTENTS 14

CREDITS/CONTACTS 16

ADVERTISERS' INDEX 18

WORKSHOP

WORKSHOP CONTENTS 137

TECH TALK

Technobabble: Understanding JPEG and MPEG compression 138

Step by Step: What to watch for when buying second-hand goods 142

OPERATING SYSTEMS

Windows 98: Using the Windows 98 Personal Web Server 147

OS/2 Warp: Getting OS/2 ready for networking 148

Mac OS: Secrets of installing Mac OS X Server 151

Linux: Make Gnome work for you 154

PROGRAMMING

Simple C++: Understanding the role of pointers 157

Java: Good programming practice explained 159



AFTER HOURS

BIBLIOFILE

Hints for helpdesk practitioners, a guide for QuickBook users 195

Perspective: Travelling at thought speed 197

INTERACTIVE

You can design a home page, a garden or a presentation for school with the software in this month's Interactive 198

GAMEZONE

Civilization: Call to Power, Lands of Lore III, Resident Evil 2, Silver, Star Siege, Australian Cricket Captain 202

WEB FILE

Big screen, small screen 206
Surfbaud: Phantom murmurs 207

CHIP CHAT

Hewlett-Packard's head honcho reveals the secrets of business success and cattle ranching, plus our regular tech gag contest 208

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apcmag.cd

Your guide to this month's APC cover CDs

apcmag.cd complements both the magazine and apcmag.com. Each month's double disc collection features software related to articles in that issue, as well as special



CD-only features and the latest Web browsers, OS patches and popular tools.

Each piece of software includes instructions on whether you will need to unzip the file before installing it; most also include README files. A complete list of software included on this month's discs is included below.

Everything you need to use apcmag.cd has been created in HTML. You do not need any special software to access the discs, other than a standard browser. The CDs have been tested using Netscape Navigator 3.0 and 4.0, and Microsoft Internet Explorer 3.0 and 4.0.

All software on the CDs is provided as is, without any warranty, express or implied. Complete terms and conditions are included on the CD itself; click on the Conditions of Use link for details.

How to run the CDs

These CDs use an Autorun feature for Windows 95, 98 and NT systems. Just insert apcmag.cd and your browser will automatically load with the apcmag.cd front page. Users on other platforms can simply launch their favourite browser and load the file DEFAULT.HTM in the root directory of the CD. For further information, see the instructions on the back cover of the CD case.

You should carefully read the licensing agreements and honour any evaluation or shareware terms specified, read all instructions and README files, and virus-check every program before use.

While we've taken every care to ensure that the software provided is useful and that it works, we cannot accept responsibility or liability for any of the products included.

DISC 2

WINDOWS OS KIT

Microsoft Euro Currency Support, DirectX 6.1, Microsoft Kernel Power Toys for Windows 95, Remote Registry Service, Windows 95 Service Pack 1, Windows 95 Year 2000, Windows NT 4.0 Resource Kit Support Tools, Windows NT 4.0 Service Pack 5, Windows NT Server Management Tools for Windows 95 A21, Zero Administration Kit for Windows 95

Microsoft Office updates

Excel 97 viewer, Office 95 Year 2000 Update, Office 97 Service Release 1 (SR-1) International English, Office 97 Service Release 2 ValuePack, Office 97 SR-2, Office 97 Version Checker, Viewer for PowerPoint 97 on PCs using Windows 3.x, Viewer for PowerPoint 97 on PCs using Windows 95/98/NT, Viewer for Word 97 on PCs using Windows 3.x, Viewer for Word 97 on PCs using Windows 95/98 or Windows NT, Windows Media Player 6.2 Beta

Essential utilities

Add/Remove Cleaner 2.01, Add/Remove Pro 2.00, Clean System Directory 1.7, Disktective 3.2, EasyClean 3.0.0.2, Emergency Recovery System ERS 98 8.68, Norton Ghost 5.1c, Registry Search and Replace 2.10, RegSnap 2.51, RemoveR 1.75, SafeClean Utilities 2.0, SafeInstall98 2.3, Uninstall Manager 3.00, WinRescue 95 8.07, WinRescue 98 3.07, Wintune 98 1.0.37

Mac OS kit

Apple Mac OS Update 8.6, Action GoMac 2.0.1, BBEdit Lite 4.1, Compact Pro 1.5.1, Fetch 3.0.3, File Buddy 5.1.1, FinderPop 1.8, Keep It Up 2.1, MacAmp 1.0b7, MacsBug 6.5.4, NetFinder 2.0, OTTool 1.0, PowerMenu 2.2.3, RealPlayer G2

Linux

Wine (Windows Emulator), Enlightenment 0.15.5, Adobe Acrobat Reader 3.02, Blender 1.62a, X-ISP 2.5p4, XAudio MP3 Player 1.0.5, RealPlayer G2 alpha, gFTP 2.0.1, Gnome, Andrew 8.0

Windows clean install kit

Adobe Acrobat Reader 4.0, Aladdin Expander 5.0, Eudora Light 3.0.6, GoZilla Free 3.5, mIRC 5.51, NoteTab Standard/Light 4.6, Opera 3.60, Paint Shop Pro 5.03, QuickTime 3.0.2, RealPlayer G2 Update 2, Winamp 2.22, WinZip 7.0 SR-1, WS_FTP LE 4.60

BROWSERS

Microsoft Internet Explorer 5, Netscape Communicator 4.6, Netscape Communicator 4.08, Netscape Navigator 4.08

DISC 1

NEW & HOT

Applet Headline Factory 4.0, Deep Paint 1.0b, Edge Diagrammer, NoteWorthy Composer 1.55, PicaView 1.31, Pop Off 2.03, RAM Booster, Speak & Mail 1.94, Window Blinds 0.90

50 shareware games

Windows: 3D 4 Cubed Chess 2.3, Aargon 1.0, Asteroids, Bricks '2000 1.0, Bubble Puzzle 97 1.3c, Championship Spades 6.2, ChessPartner 4.1, Conflict At Sea 1.01, Crossword Express 4.4a, Cubism, David's Backgammon 2.7.7, DX-Ball 2 1.2, enable Netris32 2.5, Free Solitaire 2.03, Fyrad 32 2.0, Hearts Deluxe 2.0, Hypervisual Blockworks 2.00, Jigsaws Galore 3.0, Koohg 1.0.5, Kuba, Kyodai Mahjongg 8.52, Laser Blocks 2 1.0, Letter Rack 3.0, Lexicon 1.2d,

MindWorks 1.0, Noughts and Crosses 1.07, Pacwin 2.4, Peg Solitaire 1.97a, Pick-It 99, Pretty Good Solitaire 99 5.1, Sir Bombalot 1.2.0, SolSuite 2000 4.0, Spinball 2.9, Ultimate Cribbage 5.52, UltraBlast 5.0, Video Poker Plus 2.0, VOG Checkers 1.52, VOG Othello 2.52, Yahtzee for Windows 2.0
Mac: Mactoons, Mr Cat's Quest 3, Solitaire House, Tetris Max
Linux: 3D Pong 0.3, Ace of Penguins 1.1, ClanBomber 990517, Cxhextris 1.0, KDE Games 1.1.1, LinCity 1.11, XPatience 1.04

ThemeZone

Battlestar Galactica, COPS, Dawson's Creek, Dr Katz, The Drew Carey Show, Goodness Gracious Me, Hercules, Knight Rider K.I.T.T. theme, MTV, Millennium, Seinfeld, Space Above and Beyond, Monty Python, Star Trek: Deep Space 9, Thunderbirds, X-Files, Neon Genesis: Evangelion, Mad About You, South Park theme, Wallace & Grommit

Workshop

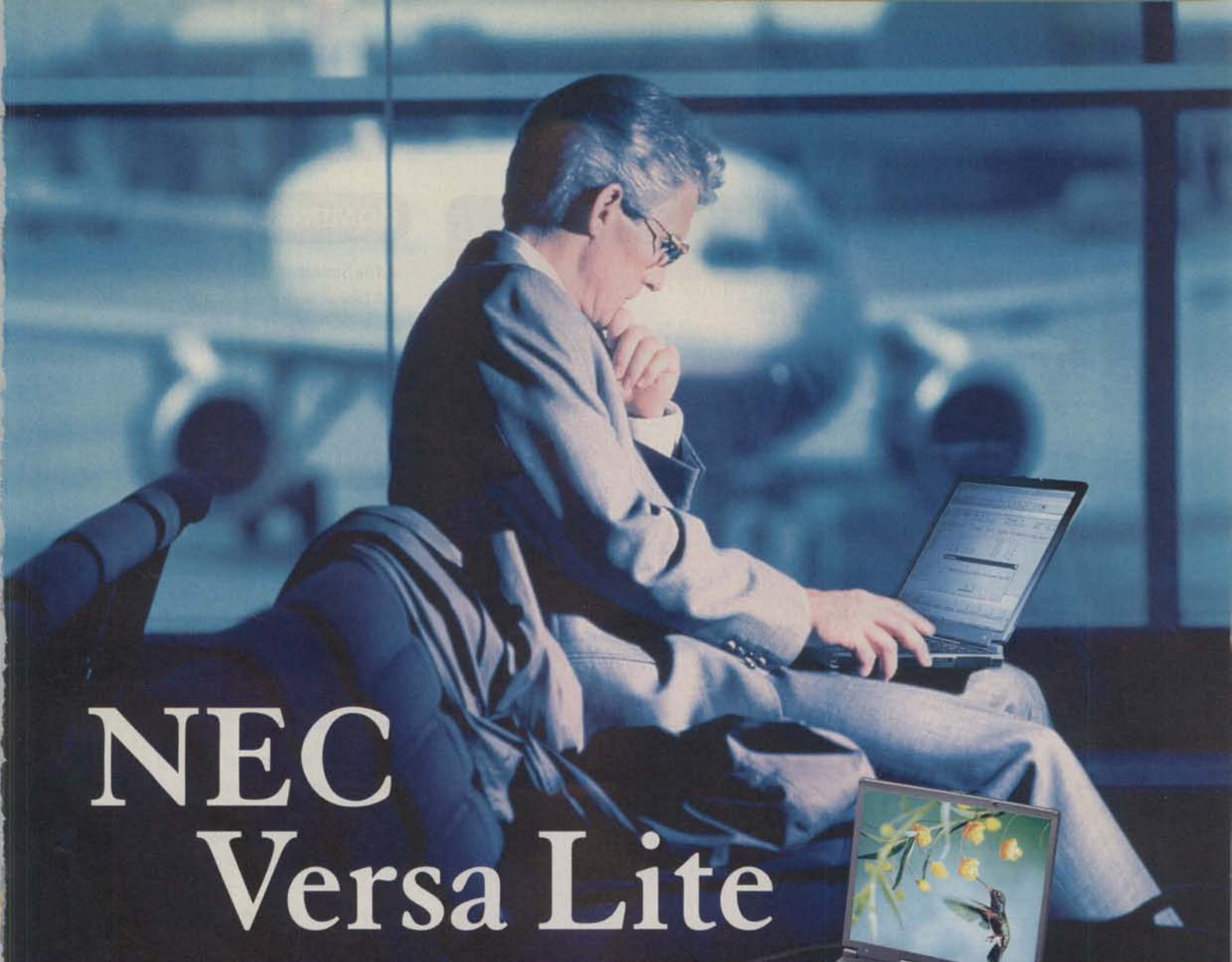
Windows: Audiograbber 1.41, MusicMatch Jukebox 3.1, Pam 1.26, MP3 Manager 32 4.73, Cool Edit 96
OS/2: A REXX Telnet API, TelnetP 1.0, Term/2 2.54b, ZOC 3.11
Mac: Solitaire Till Dawn 3.4.1, Game of the Winds 2.1, Sokoban 2.4.2a, Skat 1.1.2, X-Words Deluxe 1.0, System's Twilight 1.0.5
Linux: Treeps, SmallEiffel, Tcl Developer Studio, Xfst, Qstat

GameZone

Civilization: Call to Power movie trailer, International Cricket Captain, X-Plane HSR 4

Browsers

Microsoft Internet Explorer 5, Netscape Communicator 4.6, Netscape Communicator 4.08, Netscape Navigator 4.08



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COMING UP

● **The Sound of Music:** APC's August issue will look at how going digital is changing the music industry, and the impact it's having on how we create, distribute, buy, carry, store, and listen to music. Why do some parties love the MP3 format, and others loathe it? Can your band make its mark online? Will CDs follow vinyl into the rubbish bin?

● **Reviews:** APC Labs will produce comparative reviews of colour printers under \$1,000, Web site development tools, and the latest 2D/3D AGP graphics cards. If you're looking for more vibrant printouts, need to get a Web site up and running, or want your computer graphics to jump out at you, these reviews are essential reading.

● **Due process:** Tired of slugging it out with Intel and AMD, National Semiconductor recently announced plans to withdraw from the x86 microprocessor market. APC will look at whether this is a good thing from a technology viewpoint, and whether it will alter the microprocessor road map.

All this plus news, views, CDs and more in August APC, on sale July 22.

Get interactive!

APC's online discussion forums are filled with discussions on everything from censorship to coding. Join in at <http://apcmag.com/interactive/>.

You can also chat with APC staff during our regular Thursday night chats at NineMSN's TechPoint chat room.

Upcoming chats include:

June 24 Is Windows cracking?
July 15 Walter Wombat
July 22 The future of PC design
 All chats commence at 8pm AEST.

Check in at

<http://community.ninemsn.com.au/chat/techpoint.asp>

(Chat times and topics may be subject to last-minute changes.)

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Instructions on 'How to Enter' form part of the Conditions of Entry of all competitions in APC June. Entry is free and open to all residents of Australia other than employees of ACP Publishing Pty Ltd (ACN 053 273 546), suppliers of competition prizes, their families and associated agencies.

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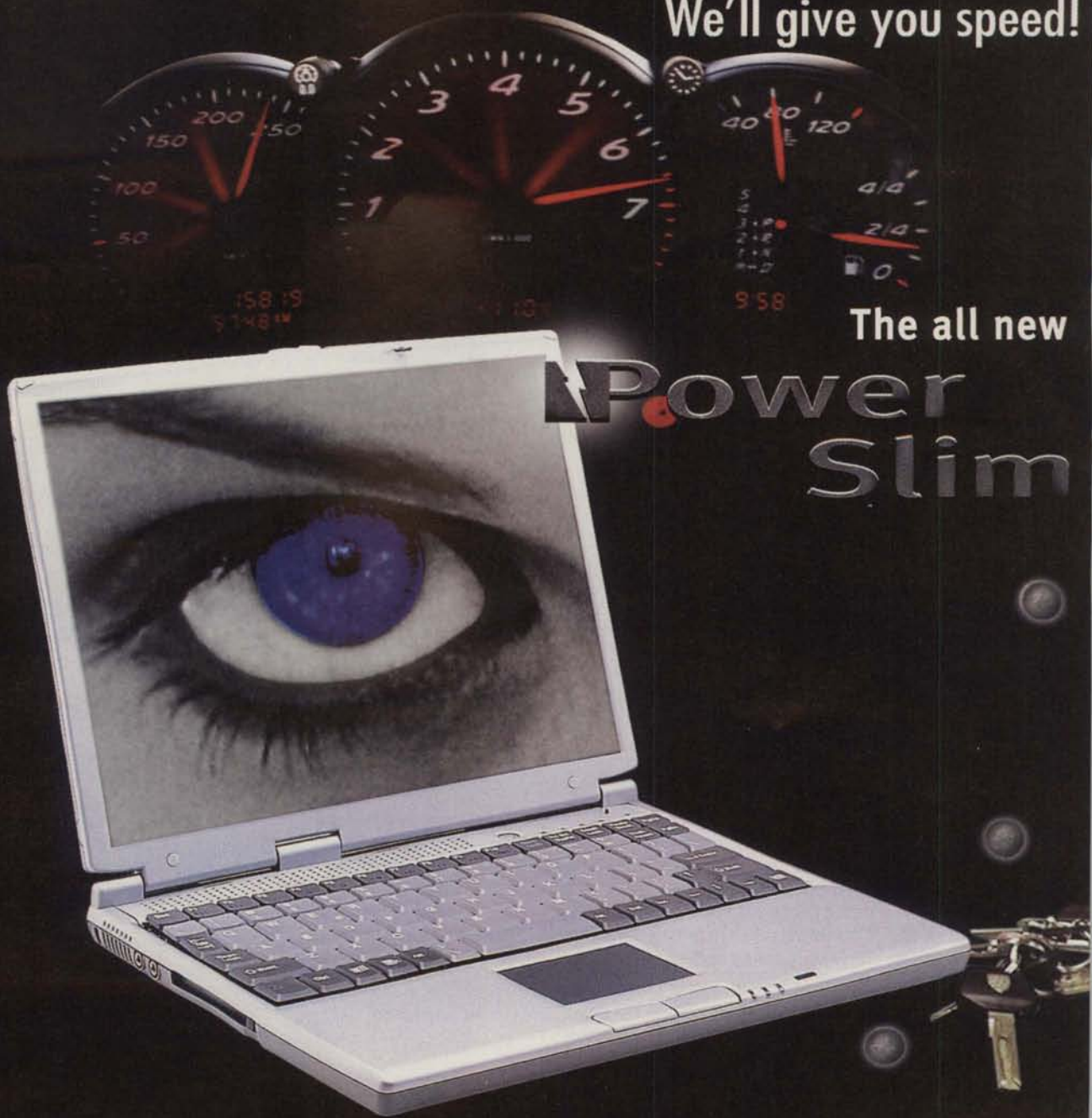
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| | | | | | | | |
|--------------------|----------------|---------------------|--------------|-------------------------|------------|-------------------------|------------|
| 3M | 104 | Focal Point | 153 | Mira Networking | 108 | CHANNEL | |
| Adobe | 37 | Gateway | 86, 87, 88, | MSI Computers | 146 | AVO | 161 |
| AFR | 13 | | 89, 90, 91 | NEC | 15, 72 | Protac | 162, 163 |
| Alfa Computers | OBC | Hallmark Computer | | NetRegistry | 117 | I.Store | 164 |
| Allergan Refresh | 64 | International | 150 | New Magic | 156 | PC SUPERMARKET | |
| American Power | 97 | Hearne Scientific | | NineMSN | 75 | Dietner | 165 |
| AOL | 29 | Software | 143 | Ocean Office | | City Software | 166, 167 |
| Bouche & Long | 32 | Hermes Precisa | 123 | Automation | 144, 145 | New RealityResources | 168, 169 |
| Brother | 9 | Hewlett-Packard | 23, 46, | OKI | 118 | Fort | 170, 171 |
| Canon | 55, 57, 59, | | 47, 100, 101 | One.Net | 39 | Sigmacom | 172 |
| | 61, 63, 65, 67 | Hire Intelligence | 81 | OzEmail | 2,3 | Mail Order Software | 173 |
| Compucon | 33 | IBM | 11 | Planet Internet | 125 | NaSa Technology | 174 |
| Daewoo Electronics | 45 | Intel | 4, 5, 77, 79 | PowerQuest | 93 | National Communications | 175 |
| Dell | IFC, gatefold, | Internet Primus | 49 | Samsung | 115 | Paw Products | 176, 177 |
| | 31, 106, 107 | Internet World | 199 | Servex | 7, 27, 106 | Corporate Software | 178, 179 |
| D-Link | 18 | lomega | 25 | Sony | 41 | Australian Computer | |
| Dynalink | 205B | Kodak | 51 | Telstra | 21, 43 | Recyclers | 192 |
| Edge Computer | 139 | MCT Australia | 133 | Total Peripherals Group | 35 | | |
| Epsco Computer | 141 | MicroGram Computers | 201 | Verbatim | 69 | MARKETPLACE | 180 to 191 |
| Epson | 71 | Microsoft | 52, 53 | Westan | 17 | | |

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BOYCOTT THREAT

Cabletron's Net crisis

Networking equipment buyers are threatening to boycott networking vendor Cabletron Australia following comments by the firm's local head which expressed support for a tight Internet censorship regime.

In a statement issued in mid-May, the managing director of Cabletron Australia, Ian Fewtrell (pictured on page 20), said the government's proposal to control what was distributed via the Net was "sound" and that Cabletron's products could be used to "monitor activities which the government may declare as illegal".

His controversial comments sparked an outcry of protest from free speech and anticensorship advocates who have vowed to boycott the company's products. One customer said he was "completely disgusted" by the company's stance.

"The government is establishing a regime to regulate what is carried on the Internet, using the latest technology to achieve it," Fewtrell said. "It means that the technology on which Cabletron's Smart-

CONTENT CONTROL LAWS PASSED

The Net censorship reality

Australian ISPs and many Net users have reacted with anger and alarm to the passing of new laws designed to control access to the Internet.

The contentious Broadcasting Services Amendment (Online Services) Bill 1999 was passed in the Senate in late May, with 34 votes in favour and 32 against. Senators Brian Harradine and Mal Colston voted to pass the bill, along with all Liberal and National senators. The Australian Democrats, Greens and Australian Labor Party senators voted against the legislation. As APC went to press, it was expected to easily pass the House of Representatives, where the Coalition has a clear majority.

As previously reported (see APC June, page 26), the legislation allows people to lodge complaints about individual sites with the Australian Broadcasting Authority (ABA). If the ABA determines that a site should receive an NC (not classified) or X rating, ISPs will be asked either to remove the site (if it is hosted in Australia) or



block access to it (if it is hosted overseas). ISPs who fail to do so face significant fines.

The exact mechanisms by which blocking will be achieved haven't been specified in the legislation. Many ISPs have said that it is effectively impossible to block access to overseas sites, a view backed by the CSIRO. If the ISP industry doesn't come up with a code of practice covering this topic that satisfies the government, then the ABA will create one.

The new laws come into effect from January 1, 2000. By the end of the year, the ABA

will have appointed at least five people to work on implementing the scheme.

In its budget, the Coalition set aside an extra \$7 million over four years for the ABA to take on the responsibility for online control. While the ABA will take complaints on offensive sites from the public, the Office for Film and Literature Classification will adjudicate on the material.

Both the Australian Labor Party and the Democrats expressed concern and disappointment about the passing

Continued on page 20

Continued on page 20



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Cabletron's Net crisis

Continued from page 19

Switch router is built can be used to monitor the Internet traffic in Australia."

But when APC (pictured), he strongly denied the comments were made in support of contentious legislation, which promises to crack down on illegal and offensive material on the Net.

"All I said was that it is technically possible to monitor the Internet — that's fact," he said. "The release was not a political statement. They are not my personal views." Cabletron is currently seeking a "partnership role" with the government.

Fewtrell said his comments had been negatively construed, and admitted he had received "a couple" of negative emails. "They're entitled to their opinion and that's it," he said. "We're talking about monitoring — not censorship."

However, Fewtrell appears to have put a number of potential customers offside. "I will never ever buy Cabletron products," said Terence Giufre-Sweetser, technical director of Teredonn Computer Engineering. The Queensland computer engineering and networking company purchases "several million dollars" worth of networking equipment each year.

"I was surprised and completely disgusted [by Fewtrell's comments]," said Giufre-Sweetser. "A vendor like that should not be involved in political situations."

Giufre-Sweetser is not alone in his view. The chairperson of an IT-purchasing division at a major educational institution also wrote to Fewtrell to express his dissatisfaction. "Your recent press statement to the effect that you are not merely willing to sell your products under a censorious regime, but are actively pleased to support censorship and control over Net usage will be foremost in my mind, at least in choosing



future infrastructure supplies," he wrote.

The chairperson, who did not wish to have his name published, said that while he would "get into trouble for choosing vendors on political views", quotes for IT services and equipment were often "within 5% or 10% of each other" and that the final decision was his.

But Fewtrell was not concerned. "Do his views reflect those of the university?" he asked. "I suggest you call the vice-chancellor and ask him."

Deputy chairperson of the Internet Industry Association, Kevin Dinn, said Fewtrell's comments are ridiculous. "The guy is obviously trying to use the bill to get a bit of free advertising for his products." Dinn said the problem with Fewtrell making his comments public was that the government would instantly refer to him as an "industry expert", even though his understanding of Net monitoring issues was "way offline".

Giufre-Sweetser believes Fewtrell's faux pas will live long on the Web and it won't be forgotten in a hurry. "They are opportunists," he said of Cabletron. When asked why he thought Cabletron was trying to win the government's favour and subsequent business, Giufre-Sweetser was quick with an answer. "At the moment, it doesn't look like they'll be getting anyone else's," he said.

Roulla Yiacoumi

The Net censorship reality

Continued from page 19

of what they believe is a flawed Internet censorship regime. The ALP was seeking amendments to the Broadcasting Services Amendment (Online Services) Bill, which included adding a sunset clause and advancing the principle of educating Net users about end-user filtering technologies. As the Coalition did not agree to these amendments, the Opposition refused to support the bill.

The Democrats have also noted a number of serious problems with the bill. Deputy leader Senator Natasha Stott Despoja said that a workable approach would be based on education, regulated client-side filtering, and the empowerment of responsible adults.

Protest

Since the passing of the bill was announced, a number of Web professionals have announced plans to move their operations overseas. Adult Web-site businesses have also predicted that most sites will go offshore. Many observers in newsgroups (which are subject to control under the act) have expressed concerns that the classification regime could be extended to encompass political criticism.

Activist group Electronic Frontiers Australia (EFA) organised marches around Australia to protest against the bill. Against the backdrop

of a bus draped in an 'Australia — global village idiot' banner, EFA spokesperson Danny Yee told the Sydney gathering that the bill will cause immediate and long-term damage to the Australian economy. "Australian adults want to make up their own minds about what they want to see and read," he said.

Internet Industry Association (IIA) director and head of ISP Connect Infobahn Australia, Vic Cinc, told APC that the government's new law will destroy the Internet. "The government has created a hostile environment for ISPs," he said. "If we cop one fine, we're history."

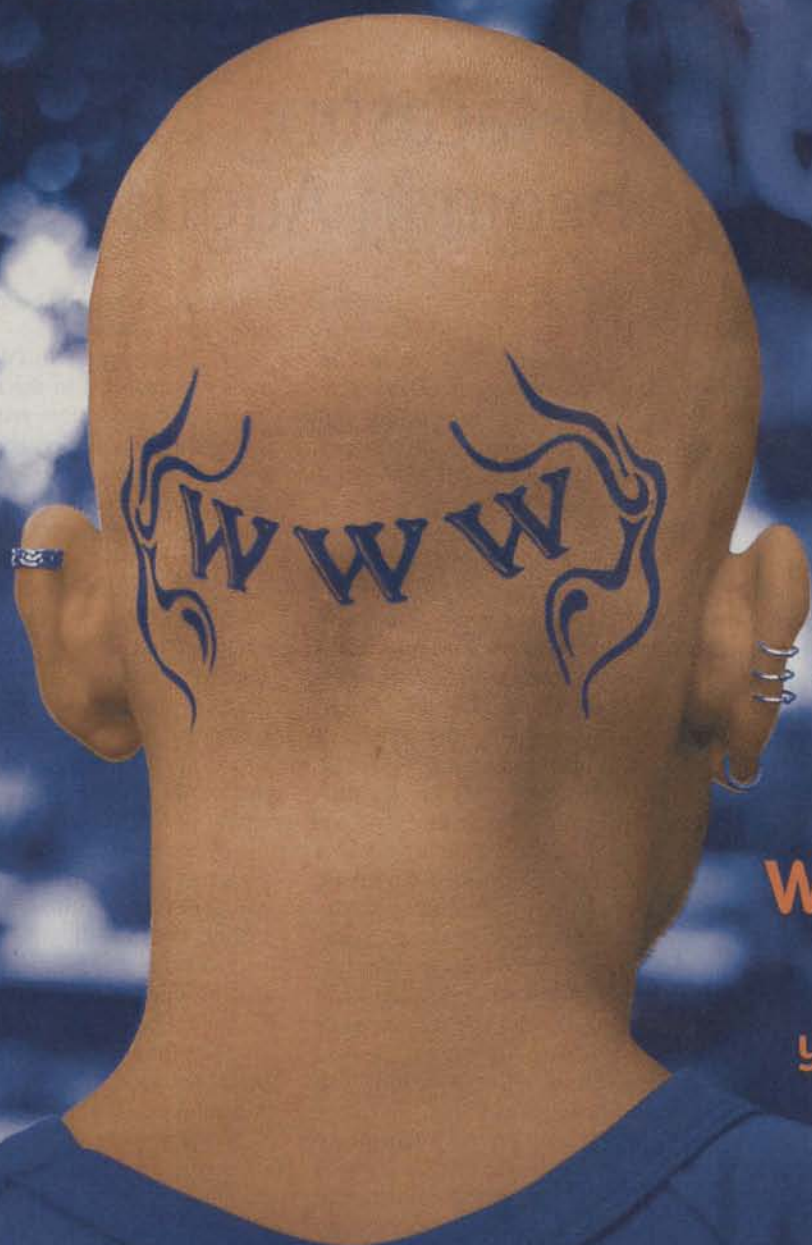
However, Prime Minister John Howard dismissed the protests. "I say to those who are protesting against it that you don't understand the mood of middle Australia on this, you don't understand how deeply many parents feel about it, with some justification," he told radio station SDN.

IT minister Senator Richard Alston conceded that the bill could not control all potentially NC-rated Net content. "The bill doesn't 'completely clean the Net' — the government has never claimed that it would," he said. "This bill is a new law, for new problems in a sunrise industry, and the government will remain vigilant to ensure that the law is as effective as possible."

Angus Kidman, Selina Mitchell, Roulla Yiacoumi and William Maher

Get the latest news on the Net censorship laws at
<http://newswire.com.au/censorship/>





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READY TO UPGRADE?

GST under control, say vendors

Developers have dismissed concerns that the introduction of a GST could cause major headaches for the local software industry.

Executives from local accounting software firms MYOB and Solution 6 said that they expected GST-capable versions of their accounting software to be released well before the deadline of July 1 next year. Development teams have already been set aside to cope with the GST and will begin work as soon as the Australian Tax Office releases the GST guidelines later this year.

Solution 6 spokesperson Rushenka Perera admitted the issue was of major concern to software firms, but predicted the changes would cause few problems. "It's just a matter of us switching that functionality on in our software," she said.

Recent estimates have placed the cost of implementing the GST as high as \$5 billion. Deacons Graham & James Lawyer David Toole warned that compliance costs could eventually outweigh Y2K costs. "The compliance costs of the GST will be greater than Y2K, and companies should

begin their planning now to deal with it," he said.

However, Solution 6 and MYOB appear unconcerned by the speculation. Both companies have already dealt with similar tax regimes in the UK and New Zealand, and expect to apply that development work in Australia. "We are lucky because we are a global provider. For a local provider, it's going to be a lot more difficult," Perera said.

MYOB CEO Craig Winkler (pictured) agreed, telling APC that GST-compliant software packages would be based on work already done overseas.

"We've certainly had plenty of experience with those kinds of taxes and that experience hasn't been wasted," he said.

However, Winkler warned small businesses not to be tempted by

imported packages, saying that only locally developed software would cope with the GST.

IT managers also appear unconcerned about the possible introduction of the GST. A survey conducted by Computer Associates' Prestige Software division found that 92% of companies believed they were already equipped for GST transactions.

William Maher



DIGITAL TV GROWS, OZEMAIL OUT

Datacasting tests begin in August

Trials of datacasting services will begin in Australia in August, giving companies other than traditional TV broadcasters their first chance to test out the digital television spectrum.

The Australian Broadcasting Authority (ABA) has released a set of draft guidelines for the tests, which will take place in Brisbane, Canberra, Newcastle and Sydney. The tests are based on a model proposed by the ABA in December last year.

In the ABA's view, datacasting (which allows text, images and data to be sent using pre-allocated digital TV spectrum) is secondary to the conversion of existing TV services to the digital format. Just one 7MHz channel has been allocated for the tests in each centre (although a second channel in Canberra may also be made available).

However, any company that wishes to test the services will be given the opportunity to do so, other than existing TV broadcasters, the ABA said. Additional trials in other areas may also be conducted, but no more than four channels will be used for trials at any one time. Test

periods have initially been set at three months.

The priority given to TV stations was reflected in the controversial decision last year to give existing television broadcasters priority allocations of digital TV spectrum at no cost. That decision angered OzEmail, which had hoped to launch its own datacasting service.

Those ambitions seem less likely now. OzEmail has downgraded its datacasting division, merging it with general consumer services and axing two staff members. Datacasting will be integrated into the newly devised OzEmail Internet division, which also incorporates the company's consumer and content businesses. OzEmail Internet will be headed by the former datacasting chief, Justin Milne.

Digital TV services are due to start by January 1, 2000, but before datacasting can begin in Australia, a definition of what those services encompass must be declared by both houses of Parliament, and a starting date chosen. A review of datacasting services is currently being conducted by the Department of Communications, Information Technology and the Arts.

Angus Kidman and Roulla Yiaccoumi



News Roundup

● Caltex Australia has struck a five-year IT outsourcing contract worth \$45 million with services giant EDS Australia. Under the deal, EDS will receive \$36 million to manage Caltex's client/server infrastructure for a period of three years. The company has also signed a nine-year contract to supply hardware and support services for Caltex's integrated fuel card system, Caltex

Starcard. EDS will assume responsibility of the company's desktops, networks and servers, while Caltex plans to maintain control of SAP application development.

● Intel and Hewlett-Packard's push into the 64-bit processor space has passed another milestone with the public release of the IA-64 instruction set. IA-64 effectively replaces the instruction set which has been used by Intel in various forms since the 386 processor, although one of the aims of the new instruction set

is backward compatibility. The Application Instruction Set Architecture Guide can be downloaded from both the Intel and Hewlett-Packard Web sites.

● The handheld market is showing no sign of slowing down, with shipments expected to exceed 5.7 million units in 1999, according to Gartner Group's Dataquest. The *Mobile Computing Forecast: 1999* report predicts worldwide handheld shipments will reach 21 million by 2003. In 1998, some 3.9 million units

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1. Estimated network printing market share based on Dataquest II ppm and above monochrome laser printer market data for Asia-Pacific collected between January to September 98 in Singapore. HPM 0023

SIZZLING!

Sausage snags a set of lucrative deals

Sausage Software, once the dead dog of Net stocks in Australia, is enjoying a remarkable resurgence, scoring major deals with chip giant Intel, global Internet provider AOL, and local bank St George.

Sausage has privately placed 5 million shares with Intel at a price of \$1.31 per share, giving the deal a net value of \$6.55 million and Intel a 5% stake in the company. The deal came less than a fortnight after St George bought a \$6.75 million stake in Sausage, although it paid \$1.35 per share for its 5% stake. Sausage has also recently inked a deal with AOL to customise Web design tools for its massive client base.

When it debuted in October 1996, Sausage quickly attracted a book value of \$90 million. However, a failure to meet projections and internal management problems soon saw its stocks decline dramatically. This year the company has recovered and is now focusing on its HotDog Web site development tool and specialised ecommerce projects. Earlier this year, it purchased privately held Prometheus Software to assist in its ecommerce goals.

Ecommerce is central to both the Intel and St George deals. St George and Sausage

have formed a "strategic partnership" to develop ecommerce solutions in Australia and overseas. As part of the deal, St George will subscribe for 5 million ordinary shares in Sausage, at \$1.35 per share. St George managing director Ed O'Neal said the deal would position the bank as a "pre-eminent provider of Internet-based banking and ecommerce payment solutions to customers across Australia".

Sausage Software director Wayne Bos said the company had been talking to several organisations as part of its ecommerce push. "We're getting into this market with gusto," he told APC.

Under the AOL deal, Sausage's Web page authoring tool HotDog Express will be customised for AOL's 17 million viewers. "That really is very significant for us in terms of brand exposure," said general manager of Sausage Internet tools Andrew Walsh. "We are there with the endorsement of the biggest portal in the world."

More than 80% of Sausage's corporate sales come from North America; but the customised HotDog Express for AOL Hometown represents a consumer-oriented push.

Angus Kidman and Roulla Yiaccoumi



Cashbook

It was a good month for deals that didn't quite make the cut. Cable & Wireless Optus (C&WO) abandoned its takeover offer for rival AAPT after the Australian Competition and Consumer Commission refused to clear the bid, saying it would remove a substantial competitor from the market. AAPT had resisted the offer, saying that the \$5 per share offer was at least a dollar too low.

C&WO CEO Chris Anderson said that the company would pursue other opportunities in the market. The company will maintain its existing 10.6% holding in the company, although that's likely to be worth less as AAPT shares dropped sharply once the takeover was announced.

Local hardware firms Sirius and Hypertec have also called off plans for a merger. The two companies announced plans to join forces in March, hoping to leverage Hypertec's Asian distribution networks to push Sirius' modems into the region. However, the merger was called off in late May. In a statement issued to the ASX, Sirius said that "the parties did not come to an agreement on some commercial arrangements".

Hypertec managing director Colin Lillywhite told Cashbook that he was "disappointed" the deal did not go through, but declined to elaborate. But he added Hypertec was pursuing "three or four" other deals to more effectively use its resources in commercialising new technologies, and these would be fast-tracked following the collapse of the Sirius deal.

The end of the deal means Hypertec won't be able to shortcut its way to an ASX listing, but floating remains a popular option for technology stocks. Not all are being as highly anticipated as the float of ecorp, the online division of PBL (owner of APC), which caused consternation when it was revealed that pre-float access to shares would be limited to employees and current PBL and Crown shareholders.

Also getting ready to float are accounting software developer MYOB and online travel group Internet Travel. Meanwhile, both Solution 6 and Ixla have profited from share placements; the former raised \$32 million and the latter \$20 million.

For up-to-the-minute financial news from the IT sector, check out Newswire's Cashbook service at <http://newswire.com.au/cashbook/>.



News Roundup

were shipped. Sales will top \$US7.2 million by 2003, according to Dataquest forecasts. In 1999, handheld shipments are expected to rake in \$US2.3 billion, up from \$US1.6 billion in 1998.

Excite Asia-Pacific has staked its claim in the competitive regional portal market, launching its Australian site. The local Excite site boasts features typical of

the genre, including a search engine, customisable news headlines, free email, stock portfolios and reminder lists. The company is hoping its personalisation features, and existing index of 800,000 Australian sites, will give it an advantage in the local market.

For a market that consisted of little more than a few highly specialised sites a year ago, the online auctions market in Australia is growing rapidly. New player Stuff Auctions has launched its site,

hoping to exploit loyalty to local businesses as it battles against international auction giants. Company officials predict that the local online auction market could be worth more than \$50 million, but they will face stiff competition from Yahoo and eBay, among others.

For complete versions of these and many other stories, be sure to check into <http://newswire.com.au>.



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The Telecommunications Industry Ombudsman (TIO) Scheme aims to resolve disputes between ISPs and consumers — but can it solve a dispute between ISPs and itself?

TIO's registration tangle

A group of Internet service providers publicly named by the Australian Communications Authority (ACA) has voiced concerns about the Telecommunications Industry Ombudsman (TIO) Scheme, which aims to arbitrate in disputes between consumers and communications service providers. One ISP has compared joining the TIO scheme to signing a blank cheque.

In late May, the ACA identified five ISPs that had failed to join the compulsory TIO Scheme. The five ISPs are Albury Local Internet, #1 Computer Services, Ideal Internet, Web Express and Viper.net.au.

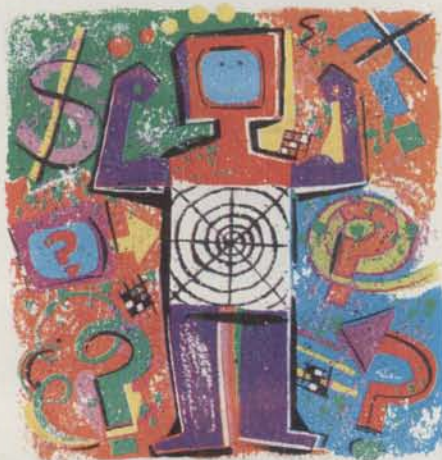
ACA spokesperson Esther Alter said invitations to the providers to join the scheme had been "met with resistance and, in some cases, hostility". Directions to join the scheme were issued to the providers, which now face a hefty fine (\$50,000 for individuals or \$10 million for incorporated bodies) for ignoring the formal warning.

Alter said the ACA was "very disappointed that the providers did not join", as the TIO is unable to investigate consumer complaints against providers unless they are members. She said the ISPs had no choice but to join.

While the ISPs gave the TIO and ACA reasons for not joining, Alter declined to elaborate on what these were. "We don't want to encourage similar behaviour," she said. However, the ISPs involved told APC that they feel some aspects of the TIO's structure are questionable, and that they have grave concerns about being forced to join the scheme.

Ross Wheeler, the founder and director of Albury Local Internet (ALI), said he does not object to joining a legitimate organisation to stamp out fly-by-night ISPs, but he has raised several areas of concern with the TIO. Wheeler says none of his questions have been answered, including questions relating to the TIO's jurisdiction and pricing structure.

"Many ISPs were coerced into signing by the threat of fines of up to \$10 million, or tricked by misleading application forms which say 'Membership for the TIO Scheme' on the front, as required under legislation, but elsewhere refer to TIO Ltd — an Australian company, limited by guarantee," he said.



"ALI has always stated it is willing to join the TIO Scheme, but to date, neither the TIO or ACA has been able to provide us with an application to the TIO Scheme that does not also require membership to TIO Ltd," he said. "This may seem like splitting hairs, but membership to TIO Ltd requires us, as a business, to sign what amounts to a blank cheque."

Wheeler said the TIO rejected his application because he had written "signed under duress" on the form, and changed all references to 'TIO Ltd' to 'TIO Scheme'. "[ALI has] been operating since 1995. In failing to join the TIO to date, we are not indicating that we have in the past, are currently, or will in the future treat our customers with anything less than professional service," Wheeler said.

Greg Kuhnert's #1 Computer Services has also opted out of joining the TIO Scheme for a number of reasons. "There is no control over charging," Kuhnert said. "There are ISPs that have been charged for a referral. The TIO is supposed to be an office of last resort." Kuhnert said the nature of the TIO further made it biased against ISPs, as it was in the best interests of the TIO for ISPs to lose against it in disputes. "Otherwise, the TIO gets no money," he said.

As well as seeking an exemption from joining the TIO, Kuhnert said he would be speaking to the owners of the other four ISPs to propose launching an alternative "self-regulatory" complaint-resolution body.

Director of Ideal Internet Darren Worley, has problems with what he calls the TIO's "blank cheque policy" charging

regime. While the TIO has often promoted the assertion that ISPs are not charged a fee unless a complaint is lodged against them, Worley said that this is false.

Worley said, that under the Articles of Association, ISPs are charged for the ongoing running costs of the TIO, can be asked to send advance payments for bills, and can be asked to fund a special levy, as the TIO sees fit. "It's amazing how many ISPs signed the membership form without reading the fine print," he said. "When I point out to them what they have agreed to, they can't believe it." He says the threat of a major fine was enough to coax ISPs to join.

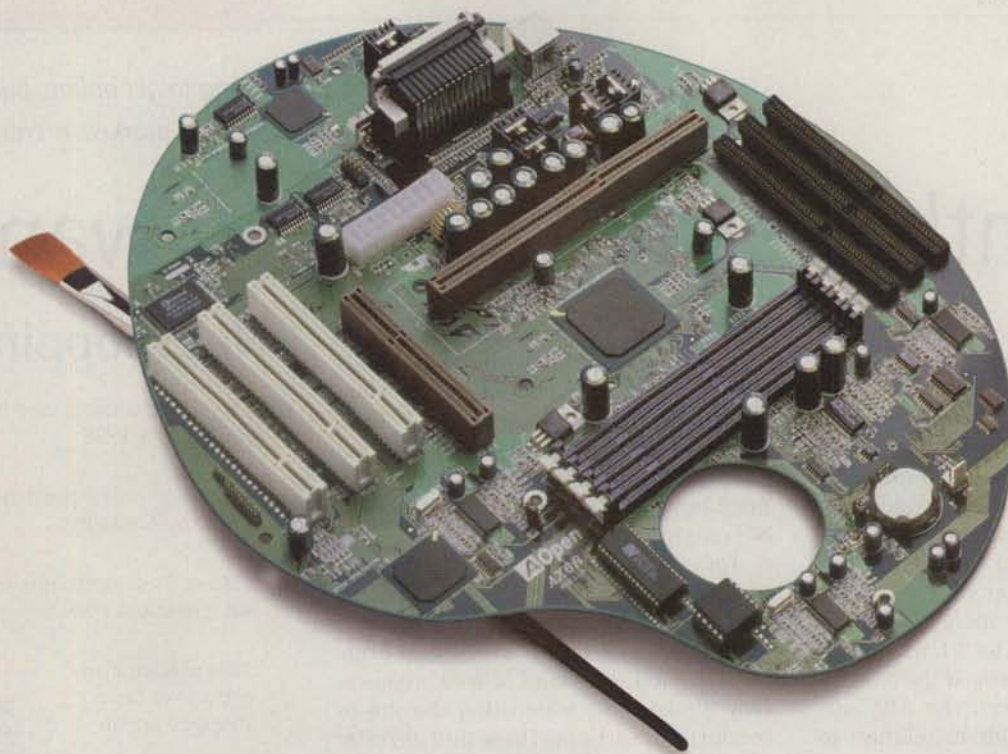
In response to the claims, Ombudsman John Pinnock said the TIO did not make the law, it simply applied it. "There are provisions for seeking an exemption," he said. "However, of 700 ISPs, less than half a dozen have ever bothered to make an application." Pinnock said the ACA should have informed the ISPs of their rights to apply for an exemption.

Pinnock said some changes were recently made to the charging structure. "ISPs will now have four free inquiries per quarter," he said. Further, the policy of charging for inquiry calls has also changed.

"At one stage, 18% of our phone calls were for inquiries such as 'Is my ISP a member of the TIO Scheme?' and 'Do you have the phone number for this ISP?' We became a de facto directory service. So yes, we did charge for these calls," said Pinnock. "However, we have recently changed this. No member should be directly billed for these costs — they are charged as a proportion of operating costs."

Pinnock dismissed suggestions of any impropriety in the existence of TIO Ltd. "That's just an idiotic view on the part of some ISPs," he said. "That has never been a secret, but we will be putting some amendments into the legislation [to make this clearer]."

That may not be enough for some ISPs. "I believe in what the TIO Scheme stands for," said Ideal director Worley. "I also believe we have valid concerns about an unlisted public company being appointed by the government to regulate the Internet industry." He said a group class action against the TIO may also be in the works. **Roulla Yiacoumi**



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Home users are rushing to get online, but some large business markets aren't quite ready.

Net enthusiasm waxes and wanes

Love using it at home, but not ready to conduct transactions over it for big business. That's the picture of Internet use that emerges from a raft of recent surveys into the online habits of Australian businesses.

On a mass market level, Internet use continues to grow. According to new figures from the Australian Bureau of Statistics (ABS), the number of Australian households online has increased 279%, from 300,000 in 1996 to 1.1 million in 1998. For the 1998 *Household Use of Information Technology* report, the ABS surveyed 13,000 households in relation to computer use, Internet access, telecommuting, IT expenditure and ecommerce.

Almost half the households surveyed (45%) said they owned a computer and 38% said the computer was used regularly, up from 31% in 1996. The ABS found these figures reflected US trends. "By the end of 1999, there could be approximately 2 million Internet households," the report states.

This supposition was backed up by a separate study, by Internet research company www.consult.com.au, which found there were 1.8 million Australians who used the Net on a regular basis. The study also found an additional 1.5 million people were casual Net users, and predicted some 10.9 million Australians would be using the Internet by December 2002. The results are based on the responses of 25,000 Net users who completed an online survey. Since discovering the Net, 44% of respondents said they watched less television and were sleeping less.

Enthusiasm for the Net is also reflected in figures tracking the number of domain names registered by different countries. According to local domain name registrar Internet Names Australia, we now have more than 100,000 names registered, which means Australia is behind only Germany (366,087) and the United Kingdom (278,406).

Almost 7.6 million Internet names are registered worldwide, and about 4.7 million of those are registered in the .com, .org and .net spaces. In Australia, the majority of registrations (80%) are using the .com.au name, said INA general manager Clive Flory.

While those Australian registration numbers might suggest that business is wholeheartedly embracing the Internet, other studies paint a different picture. Although Web sites are now widely used as a marketing tool, relatively few local firms have made the switch to using the Net as a transactional medium.

For instance, one small study by Prestige Software surveyed 25 chief financial officers at major Australian insurance firms and found that while 72% of firms involved had some kind of Web presence, only 8% of those were using the site to conduct transactions. Those that did offer transactions, did so through associated international sites rather than through their local operations.

This figure is likely to rise in the next two years, however. Of the firms surveyed, 44% planned to introduce a transaction-enabled site within the next year, and another 32% expected to do so within two years.

PricewaterhouseCoopers made a similar finding in a survey of Australian manufacturers. The survey found that 86% of Australian manufacturers were either using the Internet or expected to begin using it during the next 12 months. Internet use was most popular among organisations with more than 1,000 employees.

Despite the high level of Internet use, most manufacturers' ecommerce strategies were limited to providing company information over the Web. More than half of all respondents said they used the Web in this way, while 37% were still trying to understand how they could benefit from the Internet.

Executive boom

High costs may be one factor in the reluctance of Australian businesses to embrace ecommerce. A recent report from the Gartner Group estimated that the minimum cost for setting up an ecommerce site was \$US1 million. Security, which has long been an Internet bugbear, appears to be less of an issue. In Prestige Software's survey, only 28% of respondents said they felt the Internet was not secure enough.

While business may still be struggling with ecommerce strategies, the cliché of a CEO who's unable to use the Net appears

Net shopping

- 350,000 Australians used the Net for shopping in 1998
- 1.4 million online purchases were made by Australians
- 68% of these purchases were ordered from overseas sites
- 39% of Australian executives have shopped online

Source: ABS;
Andersen Consulting



to be disappearing. Executives' use of the Internet has increased remarkably in the past year, with virtually all senior executives in Australia now connected to the online world, according to (yet another) new survey from Andersen Consulting.

The company's *Study of Senior Executive Internet Usage* found that 98% of Australian senior executives had Internet access, and 81% go online at least once a week. A total of 55% of Australian executives said they were comfortable using the Net, compared to 50% on a worldwide basis.

Andrew Macpherson, Anderson's managing partner for technology, said understanding of the Net and its potential has finally seeped through to most levels of management. "The challenge now is to bring ecommerce into their companies."

A similar study of executives by Andersen Consulting in 1997 found that just 80% of executives had access to the Internet. Macpherson attributed the rise to the increasing convergence of the Net with PCs and other communications mediums.

Australian businesses are also increasingly efficient with email use. Australian Business Advisers surveyed Australia's largest companies to check how quickly they responded to a simple email. It found that 61% of companies with a Web site responded to an email query within one day, and 34% within three hours.

Angus Kidman, William Maher,
Selina Mitchell and Roulla Yiacoumi



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ATO e-tax

The Australian Taxation Office (ATO) is offering free e-tax software online this year for compiling and lodging tax returns electronically.

e-tax is the software version of the ATO's *Tax Pack*, with a few added benefits. The program does many of the numerical calculations and all of the information you supply in the question-and-answer format is automatically transferred to the tax return worksheet. It also gives you an estimate of your assessment once the process is complete.

e-tax is the result of several years' work and two pilots, so many of the kinks have been ironed out. It was designed for people who prepare their own returns, not to replace accountants, so if you have a complicated tax return it may not be suitable.

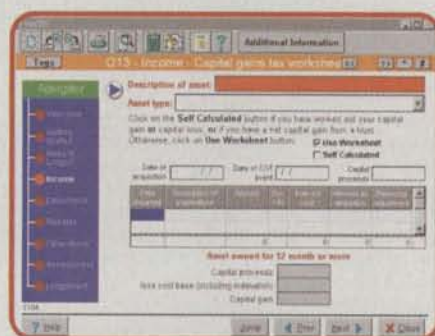
The product will be free, and should be available for download from the ATO Assist Web site by the time you read this. We were not able to go through the download procedure, but there will be three components to the 4M download: the application itself, help files and security software.

To ensure the lodgement is secure, e-tax uses public key infrastructure based on software that was recently accredited by the Government Public Key Authority. Before downloading the security software you need to meet certain verification requirements. The personal details you supply (including your tax file number) are compared with information you provided on previous tax returns. If the details match, you are given a 16-digit password and then you can download the software. You put the password into the application at the time of lodgement and it gives access to the security file downloaded earlier. The software digitally signs and encrypts the lodgment and sends it on its way. You should get a return, by mail, within 14 days.

The software takes on some of the look and feel of the *Tax Pack* and relies on a similar interview approach. The user is asked a number of questions, and depending on the answers, is taken to different sections of the application. Unlike the sometimes daunting *Tax Pack*, you only see what you need to see.

Fortunately, the final version of the product will include large amounts of help doc-

umentation. Some of these documents were missing in the prototype we viewed. About 70 booklets and all of the appropriate rulings and determinations will be able to be easily accessed from any section of the application, an ATO representative said. The help files are actually as big as the application itself, so whatever you may need to know will be there. It should be easy to find: each page has difficult terms hyperlinked to help and explanations, and clicking on the help icon takes you straight to the relevant help topic.



There are three ways to navigate through the application, depending on your tax knowledge and confidence. The simplest and most methodical way is to use the interview structure built into the application, starting at the beginning and working your way through the questions. Many require simple yes or no responses, but some require information to be typed into the tables, such as contact details and all income, rebates, deductions and so on.

If you regularly submit your own tax return, you could choose to use the Navigator which is on the right-hand side of the screen. You can jump straight to whichever section you like: Welcome, Getting Started, Need to lodge?, Income, Deductions, Rebates, Other Items, Assessment or Lodgement. Then click on a particular item in one of the menus and continue from there. Ultimately, whichever method you use, you have to follow the interview format and go through a section screen by screen. The way the package is set up, in some sections you can't move on to the next screen until all of the information required on the screen has been entered properly.

Validation

All of the validation checks used by the ATO's internal systems are used in e-tax, so any problems will be picked up and you will have to correct them before it can be lodged online. The ATO hopes this will cut down on return holdups. Click on one of the errors noted and it will take you back to the relevant screen and won't let you leave until you fix the problem. The package gives warnings, depending on the information you give, for instance to notify you of the need to keep receipts for expenses exceeding \$300.

e-tax allows for a number of separate returns. To access your particular return, you enter your tax file number. If you are a first-time user, you are then taken to some explanatory pages, and if you are returning to the application after a break, you will be taken back to the last screen you accessed. While the package is multi-user, all users will need to download separate security software and passwords.

Unfortunately, e-tax does not cater for those not using Windows. It runs best on Pentium-class machines running Windows 95/98 with at least 16M of RAM. You will need Internet access and Internet Explorer 4 or Netscape Navigator 4 or above.

For those wondering what happens to all your documentation if you lodge over the Net, the ATO advises printing a copy of the return.

It is hoped the huge masses of help data included in the application will reduce the number of calls to the ATO's help desk, but if you do have a query, special phone lines will be available to take software-related inquiries.

Selina Mitchell

ATO e-tax

| | |
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| Distributor | Australian Taxation Office |
| Phone | Not available at time of publishing |
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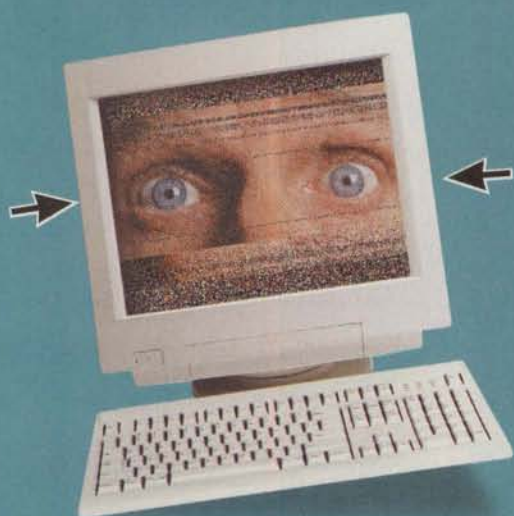
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Ultra ATA/66

Quantum Fireball CR

While SCSI is an awful lot better than IDE, even Apple has abandoned the superior technology of SCSI for the lower cost and higher availability of IDE. While SCSI moves further ahead, IDE is grudgingly making gradual improvements. The latest IDE enhancement is Ultra ATA/66, which allows burst data transfer rates of 66.6M per second, which is twice the bandwidth of Ultra ATA/33. You can't connect more drives. You can't use longer cables. It's just faster. Or is it?

We tested a 13G Ultra ATA/66 Quantum Fireball CR hard disk drive, and compared its performance with a 12.7G Ultra ATA/33 Quantum Fireball EX hard disk drive. We ran the Ziff-Davis Disk WinMark 99 and the Adaptec Threadmark 2.0 test suites, both of which test disk transfer rates under a variety of conditions. All these tests showed the ATA/66 drive to have only a marginal advantage over the ATA/33 drive. The reasons for the lack of signifi-

cant difference are obvious. Ultra ATA/33 can cope with burst data transfer rates of up to 33M per second. Currently available high-end 10,000rpm drives (which use SCSI or Fibre Channel) can achieve burst transfer rates higher than this, but 5,400rpm drives such as the ones we tested, or even 7,200rpm drives, can't. Increasing the interface bandwidth can only have a marginal effect on overall performance if the interface can handle more data than the drive can produce.

SCSI can transfer data at rates of up to 160M per second because it can transfer in parallel from up to seven drives. Ultra ATA/66 can only connect to two drives at once on each channel, and can't transfer data from both drives simultaneously. So until a single IDE drive can transfer data faster than 33M per second, which is predicted to be some time next year, Ultra ATA/66 won't make much of a difference.

Josh Mehlman

Contact details

| | |
|-------------|---|
| Product | Quantum Fireball CR and Fireball EX |
| Distributor | Quantum |
| Phone | (02) 9232 1999 |
| Online | http://www.quantum.com/ |

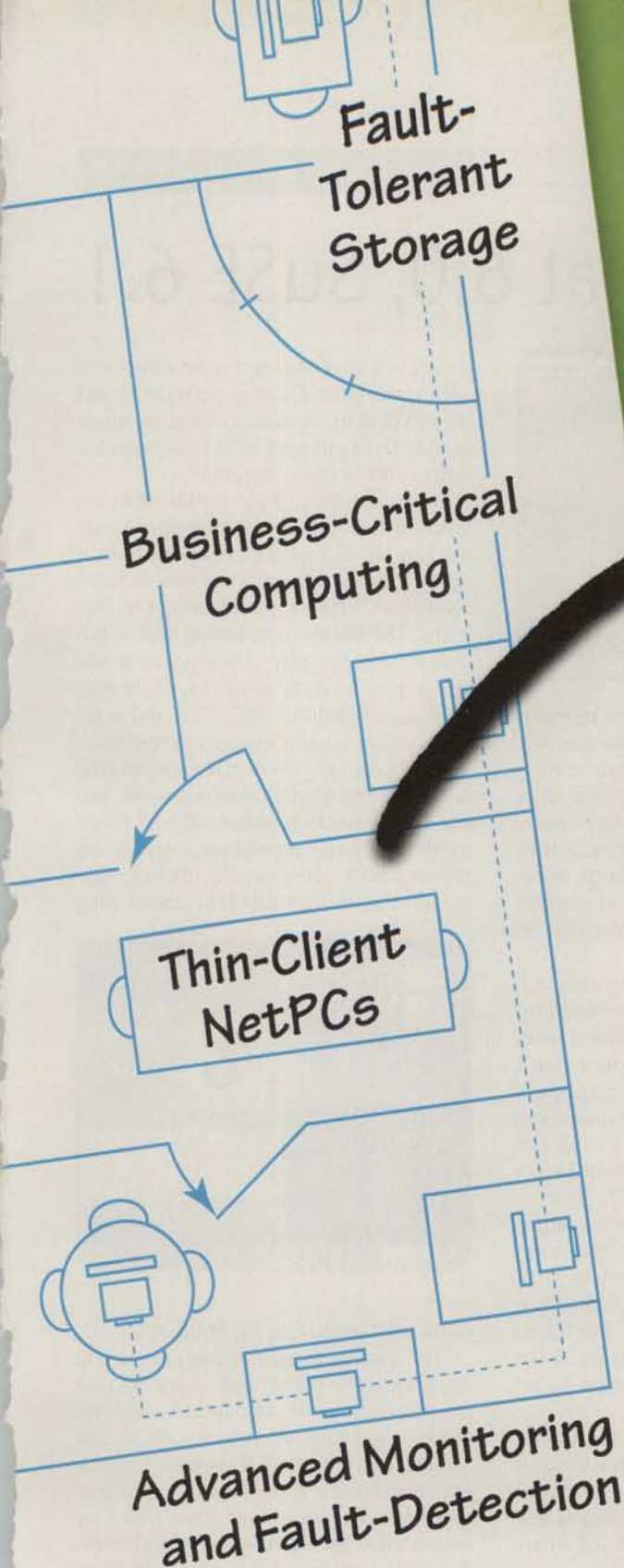
Results and specifications

| Hard disk drives | Quantum Fireball CR | Quantum Fireball EX |
|----------------------------------|---------------------|---------------------|
| Price | \$450 | \$445 |
| Interface | Ultra ATA/66 | Ultra ATA |
| File system | FAT32 | FAT32 |
| Capacity | 13.0G | 12.7G |
| Business Disk WinMark 99 (K/sec) | 2,960 | 2,890 |
| High-End Disk WinMark 99 (K/sec) | 10,900 | 10,300 |
| ThreadMark transfer rate (K/sec) | 7.6 | 6.8 |
| ThreadMark processor usage | 26.3 | 23 |

Test system specifications

| | |
|-----------------------|--|
| Processor | Intel Pentium III 500MHz |
| Level 2 cache | 512K |
| Memory | 128M |
| Hard disk controller | Promise Technology Ultra ATA/66 PCI controller |
| Video bus type | AGP |
| Video adapter | Diamond Viper V770 |
| Video RAM | 16M SDRAM |
| Video controller chip | nVidia Riva TNT2 |

The product used in these tests is the shipping version available to the public at the time of publication unless otherwise stated. Winstone, WinBench and associated products are registered trademarks of the Ziff-Davis Publishing Company. These tests were performed without independent verification by Ziff-Davis Publishing Company.



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OpenLinux 2.2, Red Hat 6.0, SuSE 6.1

Since the much-anticipated 2.2 kernel has been made available by Linus and his team, the major players in the Linux distribution market have set about releasing new and updated versions of their products. Within a short space of time, OpenLinux 2.2, Red Hat 6.0 and the German-based SuSE 6.1 have hit the shelves, boasting a variety of new features to tempt new and old users.

As Linux distributions, all of these products contain the standard Linux suite of Web, file transfer, email, news and Windows networking servers, as well as a host of utilities and programs. They also all sport the latest 2.2.5 kernel, which is expected to deliver exceptional performance and stability, and introduced new features such as SMP and software RAID support.

Caldera OpenLinux 2.2

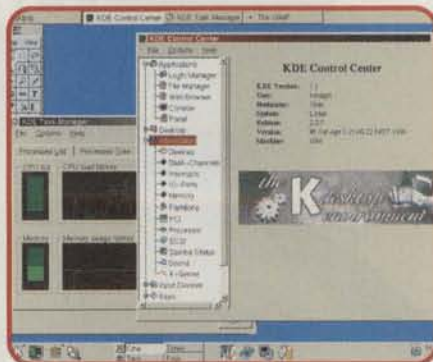
Caldera's latest version of OpenLinux is the first distribution to incorporate a graphical installation from start to finish. This has instantly upped the ante in the easy-to-use distribution market, making Red Hat — previously famed for being the easiest to install and use — seem primitive by comparison. Lizard, the Linux installation wizard, isn't just a pretty face either — it's actually a well-designed program that incorporates two brilliant additions.

Firstly, it allows you to configure your new Linux system while simultaneously copying files to your hard disk. You can configure your video card, set up networking, add users and configure the root account. So what's an administrator to do when they've finished setting up the system before the packages have finished copying? Play Tetris, of course! Yes, Caldera had the foresight to include a game to play while Linux is installing.

Also, installing OpenLinux doesn't

Caldera key features

- Kernel 2.2.5, KDE 1.1, XFree86 3.3.3.1
- Install from within Windows
- Fully graphical installation procedure
- Configure your system during installation
- Play Tetris!
- StarOffice 5, WordPerfect 8, Partition Magic



even require a reboot. From the moment you start the bootable CD (or use the start-up floppies) you can install, configure and then boot right into OpenLinux in one fell swoop. For Windows users accustomed to rebooting every time they change the colour of their desktop, this is a whole new paradigm for computer technology. If Linux developers can do this, why can't Microsoft?

There is one exception to this no-reboot rule — Caldera has included an option to start installing OpenLinux while in Windows, complete with installing and running Partition Magic to make space for Linux. Understandably, a reboot or two is required to install the software and partition your drive before installing OpenLinux.

If these features aren't enough, Caldera also supplies the very best commercial applications, bundled in with the OS. As mentioned above, there is a special Caldera version of Partition Magic, as well as StarOffice 5 (a Microsoft Office-compliant office suite) and Corel WordPerfect 8.

OpenLinux comes with KDE (the K Desktop Environment), and Caldera has done an excellent job of integrating the installed packages into the KDE menus. Unless you need to do something tricky, you'll rarely need to drop to the command line.

OpenLinux 2.2 is aimed at the corporate desktop, boasting an integrated, complete, end-user office environment, as well as easy installation and management to keep administrators happy.

Red Hat Linux 6.0

Red Hat is currently the most recognised and popular Linux distribution. Having established itself as the most user-friendly distribution, interested people flocked to earlier versions in order to get

a taste of Linux. Red Hat must have been doing something right, because it has skyrocketed in the Linux arena, so much so that Netscape and Intel have invested large sums in the company.

So it was with anticipation that we installed Red Hat 6.0 on our testbed Linux machine (a Compaq Deskpro Pentium II 400MHz system) to see what new wonders awaited us. Initially, there were not all that many. The Red Hat installation routine has been changed slightly to incorporate installation from an HTTP source (in addition to the usual CD-ROM, NFS, FTP and hard disk), a tree-based package-selection structure, support for SMP out of the box, and the option of setting up shadow passwords during install. Another feature, shared by all the distributions covered here, is the option to boot into X automatically after installation and, in the case of Red Hat, log in using



GDM (the Gnome Display Manager).

The average install size has increased to approximately 600M, but, depending on the packages you select to install, an installation could take up between 300M and 1.1G of hard disk space. The default operating environment is the popular Enlightenment window manager (developed by Australian Carsten Haitzler) and Gnome, the GNU Network Object Model Environment. Gnome is designed to work with Enlightenment and offers a fully standardised drag-and-drop desktop environment. WindowMaker is also included, and it works well with Gnome. Plenty of configurable themes come with Enlightenment and Gnome, so you can tailor the look of your desktop.

Red Hat also comes with KDE, which is a more mature desktop environment with the same goal as Gnome. Both KDE and Gnome come with plenty of applications — from multimedia players to text editors, sched-

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Red Hat key features

- Kernel 2.2.5, Enlightenment 0.15, WindowMaker 0.53, Gnome 1.0, KDE 1.1, XFree86 3.3.3.1
- New HTTP installation method
- Well integrated Enlightenment/Gnome environment

ing tools to system applications — so that your default installation has all the office and administration programs you'll need to configure and use your system. Red Hat has done a good job integrating the installed applications into the Gnome menus, right down to including the full list of KDE applications if you choose to install both environments. This is excellent, as it gives you the best of both worlds.

The third bundled CD contains a large collection of demonstration programs for commercial products, so users can try out some of the commercial applications currently available.

Overall, Red Hat Linux 6.0 is a well-integrated distribution that builds on the success of previous versions.

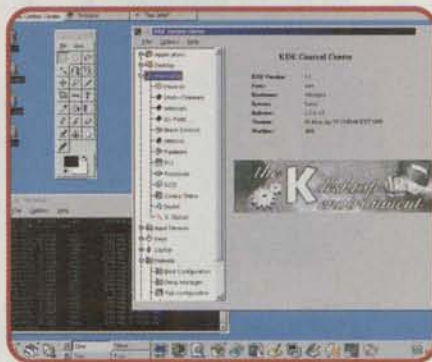
SuSE Linux 6.1

SuSE has been around for a long time but doesn't seem to get much mention in the Australian IT media. With the release of SuSE 6.1, we decided it was time to see what the European-based Linux distribution offered. The answer is 'more than you probably need'. SuSE 6.1 comes on five CDs, which contain just about any Linux tool or application ever developed. While it's possible to opt for a normal installation size of about 500M, the full 'give me everything' install takes up a whopping 4.5G.

Don't worry, if you want to get the most out of SuSE you don't need to install all five discs, but the vast selection of software

does give you choice in the array of applications that are available for Linux. For example, five window managers are included (fvwm, WindowMaker, icewm, Enlightenment, and blackbox) in addition to the standard operating environment choices (Gnome 1.0, KDE 1.1). There are plenty of development tools, games, multimedia applications, database software and even support for 3Dfx cards out of the box. SuSE also comes with two unique tools, YaST (Yet another Setup Tool) and SaX (SuSE advanced X-configuration) which tailor your system and graphical environment respectively.

Installing SuSE is certainly confusing. The installation routine isn't intuitive and there is no attempt to walk you through it. Still, it's a highly configurable routine that lets you choose every last option, including specifying individ-



ually (if you have an hour or six to spare) which components from all five CDs you want to install.

The default environment for SuSE is KDE, but unlike OpenLinux, there hasn't been much effort to integrate many of the installed packages into the KDE menus. This means you have to search your system to find all the packages you chose to install.

Overall, SuSE is an ideal distribution if you yearn for lots of Linux applications on CD, but it's not a newbie-friendly distribution.

SuSE key features

- Kernel 2.2.5, Enlightenment 0.15, WindowMaker 0.53, Gnome 1.0, KDE 1.1, XFree86 3.3.3.1
- StarOffice 5, WordPerfect 8
- More software than you can poke a kernel at.

Conclusion

Linux has certainly come a long way, especially in terms of usability, but it's not quite there yet. While two of these distributions make it easy for new users to get into Linux, most distributions (except OpenLinux 2.2) still need to streamline the installation process, and all distributions have yet to provide a completely watertight and integrated operating environment — both Gnome and KDE are still under development.

However, these problems don't detract from the milestones that have been reached with these distributions. The new features and level of integration that has been provided are impressive. Which distribution you should choose really depends on what you want. Red Hat is well integrated and easy to use, OpenLinux makes installing a breeze, and SuSE comes with everything you'll ever need.

Ashton Mills

Interested in Linux? The *Revised Edition Linux Pocketbook* is an updated and expanded revision of the *Linux Pocketbook*, and comes with three cover CDs containing all the best software from the Net and an updated version of Red Hat 6.0.

More of the easy Pocketbook style, more cover CDs, more Linux. Coming soon to a newsagency near you.



Linux distributions

Caldera OpenLinux 2.2

- **Distributor** Custom Technology
- **Phone** (02) 9686 4055
- **Online** <http://www.customtech.com.au/>
- **Price** \$99.95
- **Includes** Getting-started guide, two CDs, 90 days free tech support (email)
- **In short** Very impressive installation, complemented by excellent bundled programs.

Red Hat Linux 6.0

- **Distributor** EverythingLinux
- **Phone** (02) 9798 7604
- **Online** <http://www.everythinglinux.com.au/>
- **Price** \$149
- **Includes** Installation manual, getting started guide, three CDs, 90 days free technical support (email) or 30 days (phone)
- **In short** Slick and fast, excellent integration.

SuSE Linux 6.1

- **Distributor** EverythingLinux
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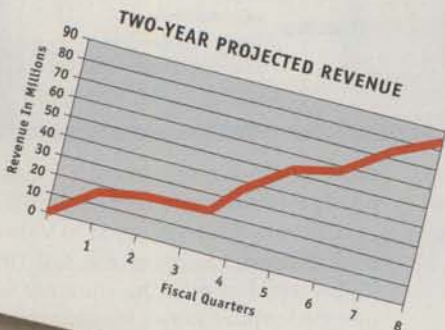
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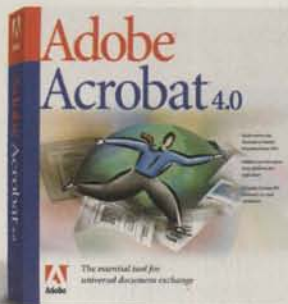
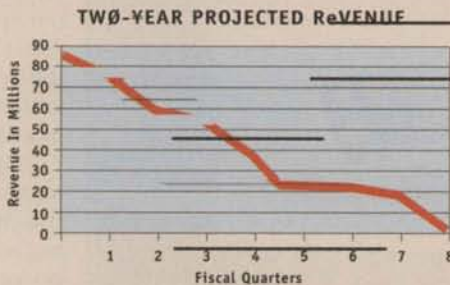
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VMware for Linux

We rarely make blanket statements in APC, but VMware is a very impressive product.

For many years now, an almost Holy Grail-like goal in computing circles has been to allow one platform to run the programs of another platform. Emulators for the 8-bit machines to which we owe our computing history have been around for a long time, but rarely can you find one that successfully emulates today's machines and software.

VMware is a PC emulator for the PC. It creates a virtual PC on your desktop that acts and behaves as a complete virtual machine, right down to being able to enter the BIOS and change its settings. There have been PC emulators in the past, particularly on the Linux platform, but they were always slow and, more importantly, buggy. It's easy to understand why. Programming a virtual PC is no easy task. You have to completely create all the resources a program or operating system expects to see, while keeping on good terms with the operat-



ing system on which the emulator is running. This is much harder than it sounds, which is why some virtual PC emulators have been under development for years and still haven't been successful.

For these reasons, VMware is impressive. It's the first to succeed, and it's not only rock solid in stability, it's also fast. This review was written using Notes 5 running on Windows 98 in VMware on a Red Hat Linux 6.0 desktop. Notes 5 is no small beast, and Windows 98 isn't renowned for its stability. Yet VMware ran flawlessly and smoothly. For one who's toyed with PC emulators in the past

and recognised their inherent speed and stability limitations, VMware is a breakthrough.

Now for the killer question — why would you want to emulate a PC on your desktop? It allows you to trial a new OS in a contained environment without affecting your main OS; it allows you to develop and execute cross-platform applications right on your desktop; and lastly and most importantly, it allows you to run applications from a different operating system to the one you currently use. If you prefer Linux as a desktop OS, but frequently have to reboot Windows to use those necessary Windows applications, reboot no more.

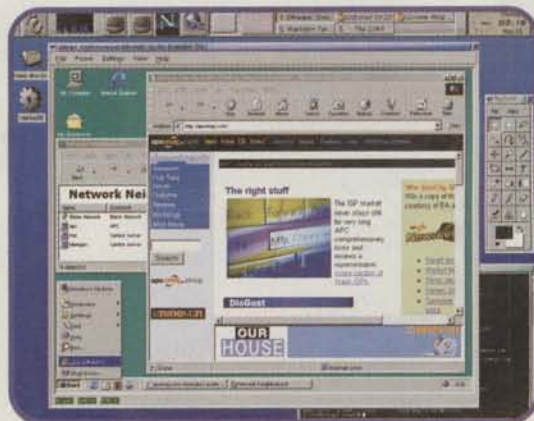
OS support

Currently you can install MS-DOS, Windows 3.x, Windows 95, Windows 98, Windows NT and Windows 2000 beta on a VMware machine and run it without a hitch. The Windows OS remains completely unaware that it's running inside a virtual PC. The Windows NT version of VMware should be out by the time you read this, and will allow you to use it in exactly the same way — you can even install Linux on a VMware machine.

VMware uses a container file to represent the virtual hard drives you create, and because of this you can easily port an entire operating system and all the programs therein by simply copying the file from machine to machine. Alternatively, VMware can boot an already installed partition, but be prepared for Windows to panic when it finds out the hardware it's running on has changed.

Limitations

Nothing in life is free, of course, and VMware has hefty requirements if you want to get a reasonably fast virtual machine running on your desktop. CPU power helps (in the magnitude of a fast Pentium II system), but RAM is more important. If you decide to create a 64M virtual machine, that's 64M less for your main operating system. As a result, although the minimum recommended



RAM is 64M, a more accurate value for good performance is 128M or more.

The only other limitation to VMware is that it doesn't support the full DirectX library yet, but then the emulator wasn't designed to play games. It's remarkable the virtual machine works so well, and even more remarkable that functions such as networking and sound support work transparently on top of this.

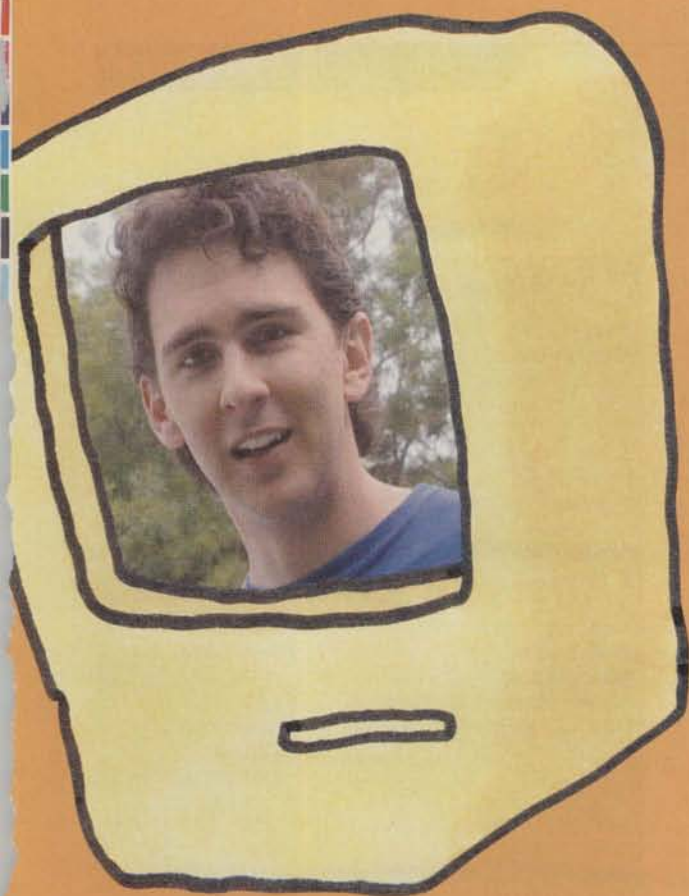
You can configure your virtual machine with its own IP and use Network Neighborhood to share files with your Linux host running Samba or with any other Windows machine accessible on the network. Sharing an Internet connection through the Linux host by masquerading also works fine. For all intents and purposes, it's a completely functional Windows machine, it just happens to be sitting on your Linux desktop.

VMware can currently be trialled for 30 days from the VMware Web site at <http://www.vmware.com/>. The price tag is reasonable, considering the target market is the corporate sector which needs cross-platform compatibility, but it will be home users that make this product successful.

Ashton Mills

VMware

| | |
|--------------------|---|
| Distributor | VMware |
| Phone | 0011-1-650-856-3300 |
| Online | http://www.vmware.com/ |
| Price | Corporate use \$US299 (\$US199 before July 14). Student price \$US99 (\$US75 before July 14). |
| In short | Runs multiple operating systems simultaneously on one machine. |



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IBM ThinkPad 570

The words 'slim' and 'robust' rarely fit together in the same sentence, but the ThinkPad 570 somehow retains IBM's solid, rugged look although it is only about one inch thick. When viewed from the top, it looks like a standard IBM notebook: the same great keyboard, IBM's standard trackpoint controller and an excellent 13.3in display. But looking at it from the side, you realise there's not as much of it as you would expect from an IBM. And at 1.8kg, it's easy to carry around.

Like similar slimline notebooks such as the Toshiba Portégé 7020ct (see APC June, page 134), the ThinkPad 570 achieves its light weight and low profile by using a docking bay to house some of the components you wouldn't need when using the notebook away from your desk. The docking bay is interesting, as it is designed to be as portable as the notebook. With the docking bay attached, the notebook simply appears to be a chunky, higher-end notebook. Without it, the notebook is slimlined for ultimate portability.

The ThinkPad 570 has an internal hard disk drive, but the floppy disk attaches externally, and the CD-ROM or DVD-ROM drive is built into the docking bay.

One of the things we really liked about the Toshiba was that the connectors you would normally use at the desktop, such as the external keyboard, network, external display and printer ports, were a part of the docking bay. This way you can leave these devices connected to the docking bay while you take the notebook away. Almost all of the IBM's connectors are at the back of the notebook itself. This is useful if, for example, you want to connect the notebook to an external display such as a video projector while the notebook is mobile. However, this also defeats one of the main purposes of a

docking bay, which is to save you having to plug in and unplug your peripherals each time you take the notebook with you.

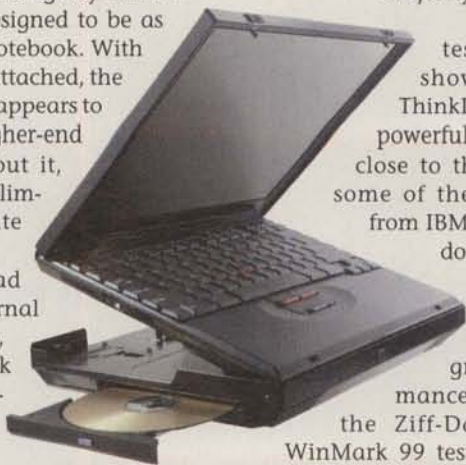
The ThinkPad 570 sits somewhere between a business and a high-end notebook. Its components are fairly high-end, and the price is at the lower end of high-end. Although comparable in most respects to the Dell Inspiron 3500 (see APC June, page 124), the IBM is more expensive, and it has a smaller screen.

On the other hand, it also has very similar specifications to the Toshiba Portégé 7020ct, which is substantially more expensive. The ThinkPad 570 has a 366MHz Pentium II processor and 64M of memory. Its 6.4G hard disk drive is a little too small for some people, but should be sufficient for the vast majority.

The Ziff-Davis tests we ran showed the ThinkPad 570 to be a powerful performer, and close to the standard of some of the top products from IBM and other vendors. Its processor performance was strong, while its graphics performance, according to the Ziff-Davis Graphics WinMark 99 tests, was among the best we've seen in a notebook. The Ziff-Davis Disk WinMark 99 tests showed its hard disk drive to be very good compared with similarly priced notebooks, but a little on the sluggish side compared with high-end notebooks. Its Ziff-Davis Business Winstone score placed it firmly in the middle ground between a business and high-end notebook.

Although the battery doesn't look all that big, it lasted well past IBM's claimed three-hour life span in the Ziff-Davis BatteryMark test. Combined with its solid design and small, lightweight profile, the ThinkPad 570 should be a favourite among road warriors.

Josh Mehlman



Product details

| | |
|------------------------------|---|
| Distributor | IBM |
| Phone number | 1800 815 154 |
| Online | http://www.pc.ibm.com/au/thinkpad/ |
| Price | \$7,793 (including docking bay and DVD-ROM) |
| Warranty | International, 3 years RTB parts and labour |
| Specifications | |
| Processor | Intel Pentium II 366MHz |
| Secondary cache (K) | 256K |
| RAM and type | 64M SDRAM |
| Maximum RAM | 192M |
| Hard disk drive | 6.4G |
| Hard disk controller | Standard Bus Mastering IDE Hard Disk Controller |
| Hard disk file system | FAT32 |
| Video bus type | AGP |
| Video RAM | 2.5M SDRAM |
| Video controller chip | NeoMagic MagicMedia 256AV |
| Pointer device | Trackpoint |
| Dimensions (cm) (H x W x D) | 2.8 by 30 by 24 |
| Bare minimum weight | 1.8kg |
| PC Card slot type | Two Type II or one Type III |
| Port replicator | \$196 |
| Docking station | Included (\$295) |
| CD-ROM drive/DVD | 2x DVD-ROM |
| Soundcard | Crystal SoundFusion |
| Internal modem | 56K V.90 |
| Display | 13.3in TFT |
| Maximum internal resolution | 1,024 by 768 |
| Maximum external resolution | 1,024 by 768 |
| Claimed battery life | 3 hours |
| Battery type | Lithium ion |
| Carry case included in price | None |
| OS available | Windows 98, NT 4.0 |
| Expansion slots | CRT, IrDA, keyboard/mouse, serial, parallel, USB, mic in, line in, audio out, modem |
| Other inclusions | Lotus SmartSuite, Norton AntiVirus |

Benchmark results

| | |
|------------------------------|---------|
| CPUmark32 | 931.7 |
| FPU WinMark | 1,950 |
| Business Disk WinMark 99 | 1,363.3 |
| High-End Disk WinMark 99 | 5,956.7 |
| Business Graphics WinMark 99 | 111 |
| High-End Graphics WinMark 99 | 242 |
| Business Winstone 99 | 14.8 |
| CD-ROM WinMark 99 | 833 |
| BatteryMark (hours:minutes) | 3:18 |

The product used in these tests is a shipping version available to the public at the time of publication unless otherwise stated. Winstone, WinBench and associated products are registered trademarks of the Ziff-Davis Publishing Company. These tests were performed without independent verification by Ziff-Davis and Ziff-Davis makes no representations as to the results. To test the battery we had APM enabled on all notebooks. All power-saving features were disabled. Notebooks require an internal resolution of 1,024 by 768 to run these tests.



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SONY

Intel 810 motherboards

Dell's \$1,699 Dimension L400c is the first whole system APC has tested that uses Intel's 810 chipset. Several motherboard vendors also had samples available at the time of writing, including MSI and AsusTek, which are mentioned below. The Dimension L and all of the other 810 motherboards we've seen so far use the highest-performance chipset variation, the 810DC100, and given Intel's performance claims and the marginal extra cost, we expect that it will appear on most 810 motherboards.

Additionally, none of the motherboards were supplied with software modems or sound. Two had sound chips on the motherboard, and one had an integrated net-

work chip. The Dimension L we looked at had neither, instead using a PCI Sound Blaster Live card. Dell also included a Win-Modem, plugged into one of the four PCI slots. The system had two memory slots, one of which contained a 64M DIMM.

We tested the 400MHz Celeron-based Dimension L, and found some interesting results. Up to a point, the 810 chipset performs very well for 3D. For most tests, its results were almost on par with a chipset like the well-regarded Riva TNT. But it did start to thrash when larger textures and higher resolutions were required, and produced some very low results in some of the more intensive tests, bringing its overall score down. Obviously, the use of system memory does cause problems in some instances. Consequently it scored only 368 in Ziff-Davis' 3D WinBench 99 — a reasonable score and almost equivalent to a chip like the S3 Savage3D. In comparison, a Riva TNT running on a 450MHz Pentium II scored 585 when tested (see APC June, page 46).

The image quality was excellent, even though the 810 only supports 16-bit colour. Applications using 24 and 32-bit textures, such as Quake 3, will suffer a little, but quality on existing applications is excellent. The chip can only support a 3D resolution of 1,024 by 768, so those of you who want to run at

extremely high resolutions should look elsewhere. Its 2D performance was also quite good, and compares well with most other available 2D cards.

Other motherboards

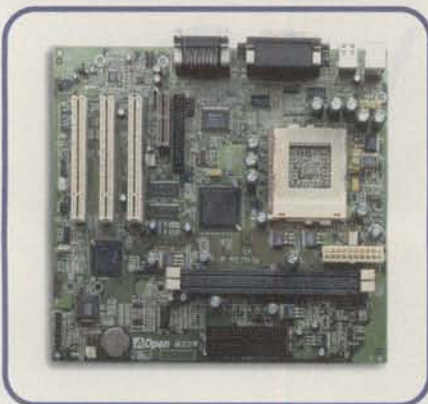
We also had the chance to take a look at several other motherboards. While space prevents us from printing the results here, there were some noteworthy aspects.

The **MSI MS-6178** also uses the 810DC100 chipset variation and has a dedicated sound chip (the Aureal Vortex 8810) embedded in the motherboard, rather than soft audio. Nor does it use a software modem, although it does have the special port for the insertion of a soft modem interface. It has three PCI and two DIMM slots, and meets the PC '99 guidelines with its colour-coded ports.

AsusTek's new motherboard, the **MEW Socket 370 Intel 810 Motherboard** is interesting. It has five PCI and two ISA slots, the latter provided by a custom bridging chip. Like the MSI, it also integrates a sound chip onto the motherboard, has a Fast Ethernet interface and colour-coded ports.

Nathan Taylor

For a complete run-down of the technology behind the new chipset, see 'Your next chipset' on page 114.



Product details

| | |
|-----------------------|--|
| Product name | Dell Dimension L |
| Processor | Intel Celeron 400MHz |
| Level 2 cache | 128K |
| RAM and type | 64M 100MHz SDRAM |
| Maximum RAM | 1G |
| Hard disk drive | 6.4G IDE Maxtor |
| Hard disk controller | Intel 82371AB/EB PCI Bus Master IDE Controller |
| Hard disk file system | FAT32 |
| Video bus type | AGP Direct |
| Video RAM | 4M |
| Video controller chip | Intel i810 (GMCH) |
| Soundcard | SoundBlaster Live Value |
| Operating system | Windows 98 |

Benchmark results

| | |
|----------------------|------------|
| Business Winstone 99 | 16.7 |
| Business Disk | |
| WinMark 99 (K/sec) | 2,110 |
| High-End Disk | |
| WinMark 99 (K/sec) | 4,050 |
| Business Graphics | |
| WinMark 99 | 117 |
| High-End Graphics | 339 |
| | WinMark 99 |
| 3D WinMark | 348 |

3D quality tests

| | | | |
|---|-------------|---|-------------|
| Quality/1/Flat shading | Capable | Quality/35/Alpha vertices | Capable |
| Quality/2/Gouraud shading | Capable | Quality/36/Perspective correct alpha | Incorrect |
| Quality/3/Dithering | Capable | Quality/37/Alpha comparison greater than | Capable |
| Quality/4/Z-buffer | Capable | Quality/38/Alpha comparison greater than or equal | Capable |
| Quality/5/Perspective correct textures | Capable | Quality/39/Alpha comparison less than | Capable |
| Quality/6/Nearest | Capable | Quality/40/Alpha comparison less than or equal | Capable |
| Quality/7/Linear | Capable | Quality/41/Z comparison greater than | Capable |
| Quality/8/Nearest mipmap nearest | Capable | Quality/42/Z comparison greater or equal | Capable |
| Quality/9/Nearest mipmap linear | Not capable | Quality/43/Z comparison less than | Capable |
| Quality/10/Linear mipmap nearest | Not capable | Quality/44/Z comparison less than or equal | Capable |
| Quality/11/Linear mipmap linear | Capable | Quality/45/Z accuracy | Capable |
| Quality/12/Mipmap LOD bias | Capable | Quality/46/Z bias | Incorrect |
| Quality/13/Modulate texture blending | Capable | Quality/47/Anti-aliasing 640 by 480 | Not capable |
| Quality/14/Decal texture blending | Capable | Quality/48/Triangle rasterisation | Capable |
| Quality/15/DecalAlpha texture blending | Capable | Quality/49/Texture fidelity | Capable |
| Quality/16/ModulateAlpha texture blending | Capable | Quality/50/Texture swapping | Capable |
| Quality/17/Flat Wrap texture addressing | Capable | Quality/51/High triangle count | Capable |
| Quality/18/Cylindrical wrap u | Capable | Quality/52/Fog vertex and colour key | Capable |
| Quality/19/Cylindrical wrap v | Capable | Quality/53/Fog vertex and alpha | Capable |
| Quality/20/Clamp texture addressing | Capable | Quality/54/Alpha and linear | Capable |
| Quality/21/Mirror texture addressing | Capable | Quality/55/Alpha and linear mipmap linear | Not capable |
| Quality/22/Cull counterclockwise | Capable | Quality/56/Small triangles | Capable |
| Quality/23/Cull clockwise | Capable | Quality/57/Perspective correct colour | Incorrect |
| Quality/24/Cull none | Capable | Quality/58/Perspective correct specular | Incorrect |
| Quality/25/Fog vertex linear | Capable | Quality/59/Anti-aliasing 1,024 by 768 | Not capable |
| Quality/26/Fog table linear | Not capable | | |
| Quality/27/Fog table exponential | Capable | | |
| Quality/28/Specular highlights | Capable | | |
| Quality/29/Colour key transparency | Capable | | |
| Quality/30/Alpha transparency | Capable | | |
| Quality/31/Source alpha pixel blending | Capable | | |
| Quality/32/Add pixel blending | Capable | | |
| Quality/33/Modulate pixel blending | Capable | | |
| Quality/34/Modulate 2x pixel blending | Capable | | |

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Pinnacle Studio DC10 Plus

Pinnacle System's DC10 Plus is a video capture card with a built-in video editing suite. The system comes with a PCI card, drivers and Pinnacle's Studio editing software.

Installation was relatively painless, once APC realised the card diagram in the manual was a little off — instead of using (and requiring) a separate internal audio cable to link to the soundcard, the system simply takes a feed from any soundcard line in or microphone socket. Windows had no problems detecting the card or installing drivers, and the installation process was simple and quick, including a check of hard drive speed in order to ensure optimal performance.

The DC10 Plus really shines with the Studio software that comes bundled with the card. Even complete novices will be able to quickly capture and edit video, and while the intricacies of editing down individual scene timings and sound levels can be a little confusing at first, the inbuilt tutorial guides you through the more complicated aspects of video editing. Being able to view changes on the fly through a constantly visible video window is a real godsend. When capturing video, the Stu-



dio software automatically attempts to recognise scene changes.

Scenes can then be dragged via the editing window in required order, with overlaid or caption titles added, and transitions and soundtracks can be edited in to form a final video product. Complete projects can then be output to video tape or saved in a variety of PC formats, up to a resolution of 768 by 576.

APC hit its only snag with this product when taking the final step of 'making movies'. Although it should be possible to output both to file and to video via separate windows, the software had a

tendency to crash if it had already rendered the file for video output. The solution to this was to save as a file first, then restart, open the new file and then output that to video — a little complicated, but not impossible.

APC's tests with a set of low resolution AVI files and a lengthy video capture produced good results, with only a minimum of frame skipping on the longer file, which can often be the result of a decrease in hard drive speed. The package handled the lower resolution files well, placing them in a border on the final video product. As would be expected, the final AVI files looked even better as smaller-screen files.

Alex Kidman

Pinnacle Studio DC10 Plus

| | |
|--------------------|---|
| Distributor | Hot Key |
| Phone | (02) 9922 5199 |
| Online | http://www.pinnaclesys.com/Studio/dc10plus/ |
| Price | \$699 |
| In short | A powerful package with the benefit of easy controls for inexperienced video editors. |

Nikon Coolpix 950

Nikon's Coolpix 950 is the first dual megapixel consumer compact camera to arrive in Australia, and priced at \$2,299, it represents top quality in a very usable package. Based around a 2.11 megapixel, 0.5in CCD, the 950 can store up to 32 basic resolution JPEG images on the supplied 8M CompactFlash card. For those who want top quality, the camera will also save in 1,600 by 1,200 uncompressed TIFF format — but there is only room for one on the 8M card.

The body is split into two main parts: the lens, flash and viewfinder section and the main body, which houses the batteries, storage card, viewing LCD and controls. The lens head can rotate through 270° for above-head and low-angle shooting. Framing is done via the viewfinder or the 2in 130,000-pixel LCD, which is brighter and clearer than previous models.

The controls use a mixture of rotary shutter dial and thumb wheel, very much

like most SLR cameras, plus a set of buttons on the back indicated by simple icons. These can vary according to the mode, but are easy and obvious in use, despite the high levels of complexity available across shooting modes and setup. Although it looks much like any compact camera, the 3x zoom (38 to 115mm, f 2.6 to f 4 equivalent) lens can be set to a wide range of metering and exposure modes including spot, matrix or centre-weighted, or adjusted for tone control and white balance adjustment. Multi-shot sequences can be taken at up to 2fps, or in a mini-16 format with instant capture. The internal smarts can also call up a system called BSS (best shot selection), which automatically selects from the last 10 shots for best clarity and contrast.

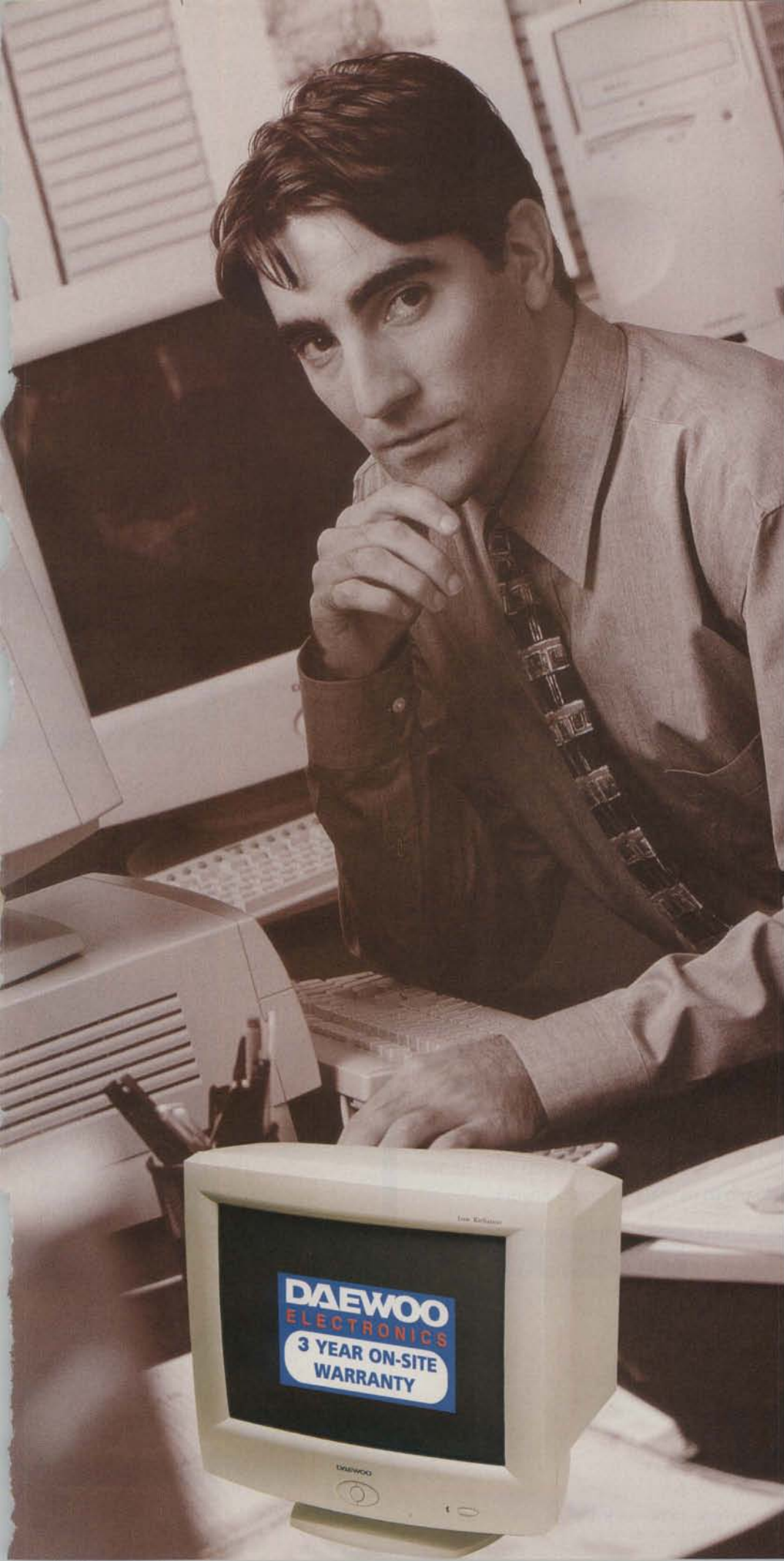
The lens mount uses a screw-in adapter ring, and Nikon offers fish-eye, telephoto and wide-angle adapters to extend the shooting potential. External flash sync is also available via a SpeedLite shoe. Image

quality is superb, with pixelation only showing at very high zoom levels, and top-quality colour rendition both indoors and out. The supplied NikonView software is a basic capture applet, and the connection is serial only — no USB or IrDA. Despite these niggles, if you want quality from a compact digital, this camera is top of the list.

Jeremy Torr

Nikon Coolpix 950

| | |
|--------------------|--|
| Distributor | Maxwell Optical |
| Phone | (02) 9390 0200 |
| Online | http://www.maxwell.com.au/ |
| Price | \$2,299 |
| In short | Superb quality, good usability and top-line expansion capability. Lightweight software and lack of IrDA or USB are the only let-downs. |



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IT Manager


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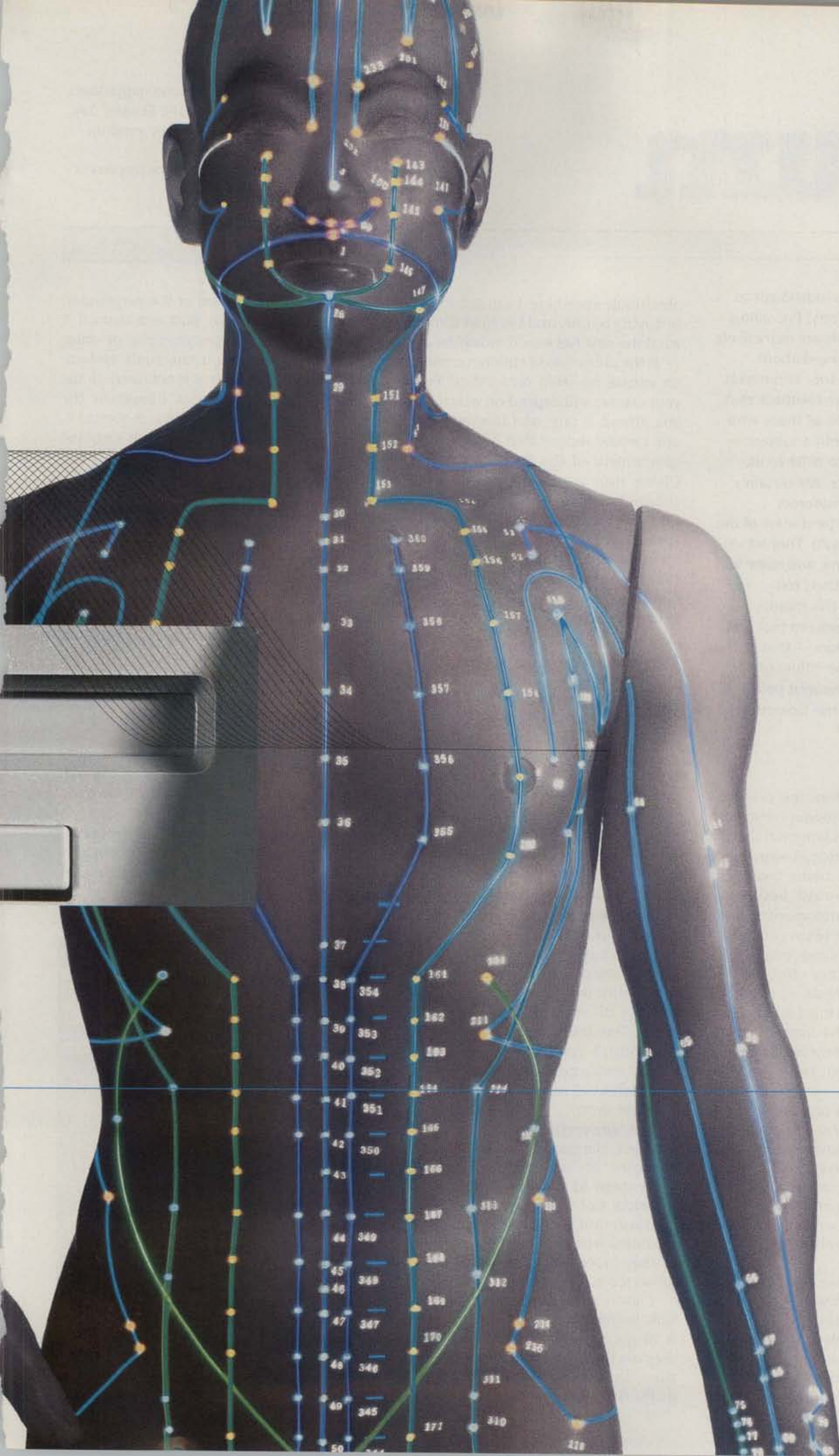
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What is it that motivates individuals to write letters to publications? Prevailing wisdom has it that people are more likely to write in if they are peeved about something. Fair enough too. This makes us appreciate the positive feedback that we receive even more. To all those who feel strongly enough about a subject — negative or positive — to write to us, thanks for your thoughts. We certainly appreciate the more considered, well-written submissions (and some of the others give us a good laugh). They let us know what you're thinking, and make for interesting reading for others too.

Among other things this month, readers expressed the concern that just as they've found a medium — that is, the Net — that can elude the influence of media barons and the thought police, it becomes subject to Federal Government censorship. *Ed.*

Net censorship

I consider it probable that the proposed new Commonwealth Internet censorship law would result in a fundamental change in the nature of the Internet experience for the person using a home computer. Basically, the Net would become a number of electronic newspapers, with you choosing your paper when you choose your ISP. ISPs would become editors that choose what material they offer, just like editors of hardcopy journals.

We could expect that most of what they offer will be similar, and from the same media sources as we otherwise get our information and opinion. There would be news, some comment, some entertainment and a great deal of advertising. If you wanted your Web page to be accessible, you would have to pay — just as you would if you were to advertise in any other kind of journal. The new electronic journals would operate under very close government scrutiny, probably more so than that applicable to other media outlets.

There is one thing we can be sure of, and that is that the Net would be a great deal less interesting than it is now. I suggest that many people would wonder if it is worth the access fee, especially since much of it would be merely duplicating services that are better and more cheaply

obtainable elsewhere. I am not interested in buying online, and I suggest that this is what the new Net would mostly be about.

Is the protection of children a reason or an excuse for [Net] censorship? Perhaps your answer will depend on which church you attend, if any, and how gullible you are. I would suggest that it is not only the government of the People's Republic of China that is uncomfortable with its citizens having free access to information, and the untrammelled right to free speech. These things make all governments feel uncomfortable, and none more than our own.

Geoff Leonard
Hornsby, NSW

Whose responsibility?

I read with interest the 'Will o' the ISP' article by Philip Argy (see APC May, page 50). Is he cynical? Realistic, I think.

To make ISPs responsible for content which they are merely a conduit for is tantamount to holding Telstra responsible for obscene phone calls, or Australia Post responsible for pornography sent via the mail system. The equivalent reaction from our esteemed politicians would be to force those institutions to examine all our telephone calls and mail. I can only imagine the reaction of the Australian people to having someone listen in to every phone call (in case someone says a naughty word) and opening and reading all mail (in case someone sends Grandma snaps of the kids in the bath). I don't really believe this could ever happen, though, because it would affect all Australians and would get short shrift.

But censorship of the Net is different. Net usage is really only the domain of a relatively small percentage of the population, and therefore not likely to generate the backlash that censorship of the other mediums would generate — as long as they [government] move before it grows too big.

Certainly ISPs should be responsible for removing any content which is illegal in their state/country once they are made aware of it, and indeed they should notify the relevant authorities of any illegalities and

assist in identification of the perpetrator, exactly as Australia Post would do if it became aware of pornography or drugs being sent through the mail system. However, if the content is not illegal in the host's location, but is illegal in the state/country of the user who requested it, then surely it is the user who is breaking the law by requesting/viewing the information.

I don't know how to stop people accessing sites they shouldn't, and I object to having someone else tell me where I can and cannot go (legally). But I do know that when my son is old enough to use the Internet I will accept responsibility for censoring his access. I do not expect others to take over my responsibility as a parent.

John Hekkens
Internet

ISPs not Telstra apologists

As an ISP I take exception to Tony Fendt's comment that ISPs (see APC May, page 42) are part of a conspiracy with Telstra to rip off consumers.

There could be many reasons for his problems and I'm sure by now I would have had his phone line checked, run through a few of the more obvious causes for getting disconnected from the server, and even lent

The image shows the cover of APC magazine. At the top, it says 'Value Buster double CD: Now with hard case and full index booklet'. The main title is 'Australian Personal Computer' with '2CDs' in a large font. Below that, it says 'Australia's leading computer magazine' and 'Nov 1999 \$6.50'. The central headline is 'BEST NET DEALS @ THE Bandwidth Bazaar'. Below this, it says 'How to: Buy the best modem, Optimise your Internet connection, Sign up with the most reliable ISP, Find the right account'. There are several smaller headlines and text blocks on the cover, including 'Bandwidth in the bush: Can the Net save regional Australia?', 'APC Labs reviews: THE FASTEST PATHS ONLINE: 24 top Internet service providers', and 'V.90 modems @ 56K'. The bottom of the cover features a 'Home Page' graphic.

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THREADS

from APC's Web sites

Inevitably, censorship has been the hot topic in APC's online discussion forums. While there have been some dissenting voices, the overwhelming majority of posters are against government proposals to restrict online access to pornographic or criminal Web sites (see 'The Net censorship reality', page 19). Paul Henry's view was typical:

This is so stupid. I can talk to a person on the phone about anything I want. The government can't step in and say that our conversation is illegal. Such things only happen in China! The only difference in what the government is proposing is that it is two computers talking to each other, not two people.

Recurring themes included the ready availability of material that would be banned if it were online ("you can go to almost any newsagent and buy porn and adult bookshops don't sell loaves of bread ya know", as one contributor wrote), the technical difficulties involved in the legislation, and the problems it might cause with material such as safe sex information.

A frequently emphasised point has been that controlling Net access should be the responsibility of individuals, rather than ISPs. One anonymous poster wrote:

The bottom line is parents have the responsibility to protect and educate their children about the facts of life, which unfortunately include porn and the existence of idiotic politicians.

A lingering issue for many was that the topic had not drawn much attention from the general public. As Steve Olive put it:

As usual with any topics that should create a lot of concern to all Australians, this Web censorship debate has not drawn a great deal of space in the general media (TV, newspapers etc). The only people that seem concerned are IT people and smaller ISPs.

With the legislation appearing set to pass as APC went to press, it doesn't look as if conversation on the topic will dry up in the near future.

Want to put across your view, or see what other readers have to say? Join the discussion at <http://apcmag.com/interactive/> and <http://newswire.com.au/sboard/>.

him a different modem to try. To suggest that ISPs are in cahoots with Telstra is ludicrous. The thought of giving Telstra even 25 cents more than I need to makes me cringe. I think it's obscene that I have to pay Telstra rental on every phone line I provide for my users to dial in, even though I never make an outgoing call. That's right, my users make approximately 1,000 calls per line per month, so Telstra collects its \$250 and still has the hide to charge me rental.

I have emailed three different departments at Telstra to ask why, but not one of them has had the courtesy to reply. In cahoots with Telstra? You've got to be kidding. I'm sure other ISPs would be equally offended by the suggestion.

Ian Ward
Internet

Tony Fendt's letter in your May issue discusses ISPs giving poor service in relation to "random" disconnections. I work for an ISP in the area of tech support, and random disconnections are one of the biggest problems we deal with. We do not have a deal with Telstra to make sure that people get disconnected.

Ever since I have been using modems (I remember when a 2,400bps modem was fast) disconnections and failed connections have been a part of life. In my time using a computer, I have found some ways to aid connections and to help stop 'random' disconnections. They include:

- Ensure the modem is the only thing on its line; unplug all phones and faxes. Most importantly, make sure you do not have a Telstra Touchtone 200. You wouldn't believe how many of these phones are still around. They will cause disconnection due to a charging capacitor that charges for between five and 15 minutes.
- Ensure all cables to and from the modem are OK. And make sure that the phone lead is in good condition and away from power sources and sources of electromagnetic radiation, ie. your monitor.

On a side note, since I changed to Linux (from Windows) I have had a lot less disconnections.

Benjamin Gardiner
Brunswick, Vic

I was interested in your reviews of modems and the major ISPs in Australia in APC

May (see page 90). However, what might be at the top of the list before any choice is made about selecting an ISP and modem is whether your telephone line is capable of anything like the maximum speeds these ISPs and modems can give.

In my case, the fastest speed I can achieve using either my Banksia Wave 56 V.90 on my desktop or either of two 56K V.90 PC Cards on my notebook is 31.2K. More often I get either 24K or 28K. Worse, I occasionally get a paltry 14K. My ISP, Highway1, tells me that all its modems in Bunbury are 56K V.90 and that it is the telephone line that is the cause of the slow speed.

Telstra tells me that the line is problem free, but that they are only required to supply 24.4K. I was also told that my home line goes through a mini-exchange and the signal from my home would be converted from analog to digital and back again, and this would further slow the speed of the line. So what's the point in buying a fancy modem or splurging out on ISPs with fast modems? From my workplace in the centre of Bunbury I can access the Internet using the same notebook, PC Card modem and ISP at up to 46K and it is never less than 44K.

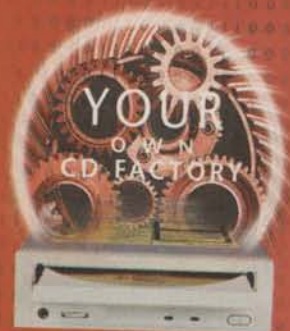
Daren Palmer
Bunbury, WA

Include Net access in USO

Selina Mitchell's article entitled 'Location, location, location' (see APC May, page 67) explores the question: will technology help revive regional and remote Australia? The answer largely depends upon whether Telstra is permitted to maintain its monopoly on, and extortionate charges for, Internet access. If the Internet is going to have real impact it will have to become widely used. Although Australia has a relatively high proportion of people connected to the Net, actual usage is low, primarily due to cost.

Our communications infrastructure is one of the most advanced in the world and there is vast unused capacity, for which the marginal cost of utilisation would be very low. Cheap Internet access should be a national priority mandated in the universal service obligation. All of Australia is a regional remote part of the global economy and inexpensive high quality communication is too important to the national interest to remain a Telstra sinecure.

Walter Starck
Townsville, Qld



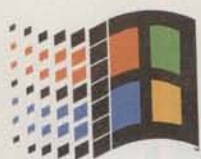
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Software changes, just in time

If current software market trends continue, we can finally kiss feature bloat goodbye — and perhaps Microsoft as well.

By Jeremy Horey

The law moves slowly, particularly in the US. So when the Department of Justice went after Microsoft, there were many observers who suggested that by the time there was any resolution and any remedies applied, the whole case would be irrelevant.

At first I dismissed these comments. I saw them as driven by historical precedents such as the cases against AT&T and IBM, not by any consideration of the current circumstances.

Now I am not so sure. The case against Microsoft is dragging on, and even if it is resolved by the time you read this, it may well be that the whole thing is no longer relevant anyway.

The software market is going to change a lot in the next few years. These changes will open up the market again and they may unseat Microsoft as the dominant force in software. I am betting that there is enough demand for a new way of doing things that just-in-time software will replace shrink-wrapped software.

To understand why these changes are inevitable, it is worth looking at how the software market has evolved. Since the release of Windows 3.0 in 1990, software designers have had a much more extensive set of capabilities. As a result, people have run much more complex sets of applications. But this has also meant a lot more complexity in software.

At the same time, networking went through a rapid growth phase. Back in 1990, networks were important and a majority of PCs in corporate environments were linked to networks. However, networks were used mainly for sharing files and printers.

Today, networks are indispensable. They provide access to the data and applications that users need for their daily work. Even outside the business world, many computers are connected via the Internet.

This has been good for end users and for people who sell networking software. It has not been so good for people who have to manage the software that these PCs use. The setup of PCs is much more complex, so upgrading software is also more complex and difficult. An alternative way of delivering the functionality of modern software that doesn't require these constant big upgrades starts to look more attractive.

At the same time, software vendors can see that they are delivering less and less real value with each upgrade. Products are cannibalising each other rather than delivering new stuff. My word processor has functions that were once part of a desktop publishing program, a drawing program, and a Web browser. None of this makes it a significantly better word processor. It just means that I don't have to switch between programs as often.

New strategy

So software vendors need to have a long-term strategy in place to replace the revenue they get today from selling upgrades. Eventually, even the changes to file formats between versions are not going to keep people paying out \$100 or so just for a few new features that they might use once a year.

Then there is the home market. People don't often need all the sophistication of a full professional package, but they do sometimes need some of the features that get left out of the 'lite' versions. This is another market that could be drawn to a new software-distribution model.

All these developments point in one direction: a situation where you only download and install the software that you actually want. Instead of getting a spreadsheet with a lot of functions that you may only use occasionally or not at all, you would start with the basic sheet.

You might get 64 rows by 64 columns with a few basic maths functions. Once you start using this piece, you would add modules or sets of functions as you need them.

There are several possible payment schemes. You could pay a standard rate per month, which would give you access to any basic functions in your software. A premium-rate service could offer extra functions, plus information-rich content and templates (on the premium rate, you could get a full budgeting tool, for instance).

For the home user, a monthly subscription service for software looks quite attractive. It would be easier to pay on a monthly basis and a much wider range of software would be opened up.

Another payment scheme might involve buying each small component when you find you need it. This is attractive, because you pay only once for everything that you use. On the other hand, you will pay again for upgrades. And as upgrades will only affect small modules, they will happen more frequently. If you have a lot of modules, you might find yourself paying for upgrades on a regular basis.

Finally, there is a pay-per-use option. This would involve a payment for each module each time you use it. In this model, upgrades are irrelevant and each payment is small. But over time they will add up. This model looks most attractive to the occasional user.

In this much more flexible world, Microsoft, like all the other software vendors, will have to make a new path for itself. It may be able to leverage its dominance into a dominant position in the new world — but it may not. It would be the biggest challenge the software giant has faced so far.

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Jeremy Horey is a senior consultant with Tech Talk Australia, a division of Com Tech Online. You can contact him at jeremyh@techtalk.com.au.



P-POP
is unique to Canon.
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New BJC-7100 has even more refined PhotoRealism, 25 tonal levels and the plain paper advantage.

And that's only part of the story.

Because the BJC™-7100 also features water-fast printing, even on postcard type stock, is significantly faster than its predecessor in B&W and up to three times faster for photo quality colour.

But, like all Canon high definition Professional Resolution printers, the story begins with quality.

7-colour process. The BJC-7100 has a seven-colour printing process using both conventional CMYK inks, and lower density CMY inks, plus a new image processing system. The result is not self-styled "photo-printing," but a unique Canon PhotoRealism™ process.

More sophisticated colour in 25 tonal levels. The inks can be mixed and layered to produce up to 25 tonal levels with up to 90 times the colour combinations of traditional CMYK inks. The result is finer colour gradations, richer dark tones and hard to produce light shades are virtually free of pixelisation. So high quality paper produces images that are almost indistinguishable from photographic prints.

**Professional Resolution
Ultra-High Definition.**



Better plain paper performance. Then there is P-POP (Plain Paper Optimised Printing), a process unique to the new BJC-7100. It bonds an invisible Ink Optimiser to the paper before inks are applied. The inks, in turn, bond to the optimiser. Plain paper text and lines are better defined, colours are more vibrant, tones are sharper, and print-outs become virtually water fast.



Better paper handling, full bleed A4. Better plain paper use can obviously lower operating costs. It accepts virtually all paper types from plain to high gloss photo paper, has the ability to print full-bleed A4 and even accepts card-stocks at paper-weights up to 550 gsm (0.8MM).

Canon Customer Care. All Canon printers feature a one-year warranty, upgradeable to three years for minimal cost, and are backed by Customer Care hot-line support. Drivers are available for Windows® 3.1x/95/98.

If you need high definition PhotoRealism, even on plain paper, you need the P-POP advantage. To learn more about the new BJC-7100, call us on 1 800 021 167.



New BJC-7100 – \$599^{RRP}

Canon



Privacy on parade

Are you willing to sell your personal information for a song — or an email service?

By Helen Dancer

As the hippie movement grew up, took shape and matured, hippies realised that they couldn't drive the battered kombi van into the setting sun forever, and that they had to actually turn a hand to something in order to support both themselves and the next generation of Sunbeams and Moonchild Juniors.

Many chose to till the soil, establishing enclaves of alternative lifestyle communities, living in close proximity and sharing their resources. The notion of bartering (give me some of your potatoes and I'll give you some wool, or mend your roof) quickly took hold. The direct exchange of goods and services tied in neatly with the idea of living off the land and eschewing the consumer trappings 'normal' life had to offer. If primary goods or services are the basics of your life, why not just exchange one for the other with people of like mind, and cut out the grubby capitalist middle person altogether?

Just as the alternative lifestylers established their own community and their own neo-currency of relatively valued goods and services, the Internet and its community are embarking on the same transition. In the new medium, information is the ultimate commodity, and organisations are learning that if they want information, they are going to have to learn to barter for it rather than demand it.

As more and more technologically naive consumers are exposed to the weird wired world of the Internet, it's time for a public education campaign to remind people that they have the right to ask what the information they give is going to be used for, and what they're going to get in return.

Whether it's a free email service, such as Telstra's easymail, or the almost absurd Free-PC concept that has made waves in the US, the trade-off of products and services in return for personal information (and the marketing opportunity that represents) is gathering momentum.

The trade-off for having an easymail email account, which costs nothing apart from the normal phone call charges, is a fair amount of data harvesting and the right to check back with you for periodic updates. What's your income? Marital status? This is far more information than is actually needed to establish the mechanics of an email account, but it enables Telstra to sell advertising which is targeted at demographically desirable consumers.

The trade-off of products and services in return for personal information is gathering momentum.

Similarly, the Free-PC concept recognises the advertising value of every new pair of eyeballs. In return for having you onboard and open to a raft of advertising material, the company provides the PC free.

Seasoned and privacy-minded Net users often test the boundaries of what they can get away by avoiding answering questions in the setup process, while the paranoid or arrogant simply lie. (Yes, I've been married 16 times, have 15 kids and I earn \$12 million per year. You don't believe me? Well, it serves you right for asking.)

However, the first-time user — certainly Telstra easymail's target market, and one it is pursuing through an expensive strategy of bundling software on the covers of consumer magazines — is just as likely to give it all away, because that's what they think is expected. The value of the information disclosed equals the perceived value of the service. But do users do the maths, or do they not even think about the equation?

There's an increasing awareness that personal information is valuable, and the more organisations want it, the more you should get in return. There's even a way of measuring it. CyberGold is the

patented process of measuring the value of a Netizen's personal information and the means by which people are remunerated for sharing it. According to US 'venture catalyst' and Internet enthusiast David Blumberg, this new measure is the way of the future. It involves a multidimensional trade-off between personal information disclosure, levels of service, and a payable fee.

The CyberGold methodology will have companies exchanging cybercredits with

people who are willing to part with information about themselves. Netizens will then use these cybercredits to 'buy' things they need in the online world, such as a number of hours connection with their participating ISP.

Cybercredits have a context-based value, based on what you're prepared to disclose and what you want in return. In Blumberg's vision you could disclose limited information about yourself, and receive a cut-down version of the service, or reveal more in return for more services. Alternatively, you could disclose nothing and pay full price.

Such a model is more sophisticated than a scheme such as easymail or Free-PC, but the fundamental importance of recognising the value of information remains. Of course, there are some benefits in disclosing information about yourself, your interests and your expectations — as long as you also realise that such a disclosure is just as useful to them out there as it is to you in here.

Helen Dancer is editor of the *Bulletin's* e-bulletin section. You can contact her at hdancer@acp.com.au.



1440 dpi
up to A3.
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1440 DPI, PhotoRealism, richer blacks, exceptional speed, plus independent cartridges.

The idea of a dual cartridge system has existed for awhile. But needless to say, some systems are better than others. The new BJC™-5000 proves this point.

1440 dpi with variable ink drop sizes. Both the standard colour and optional PhotoRealism™ cartridges use Canon's Drop Modulation Technology™ with variable drop sizes in resolution up to 1440 dpi. The combination delivers smoother colour gradations and far less "grain" on virtually all paper types.

New dual-cartridge system enhances performance. Then, a special dual cartridge system lets both cartridges act independently to complement each other. In "split-page mode" identical black or colour cartridges can effectively double print speeds. Or, using different ink types you can produce exceptional quality effects, with the printer automatically identifying and using each cartridge for the desired result.

90 times more colour combinations. For instance, PhotoRealism inks can be used with conventional inks for a seven-colour ink system, with multiple ink densities per pixel for up to 90 times the colour combin-

ations of conventional CMYK inks. Combined with Drop Modulation Technology the result approaches silver halide quality reproduction.

An all-new approach to black. It uses new, black ink that is blacker than conventional ink. As a result, black & white documents have an exceptionally high degree of finish. Two of these cartridges (BC-23) are included in the box, and may be used simultaneously.

Superior Photographic Reproduction
The BJC-5000 combines several technologies designed to give you advanced photographic reproduction. There is resolution up to 1440 dpi, dual drop sizes produced by Drop Modulation Technology, and PhotoRealism featuring multiple colour ink densities for layered colours using a seven-colour system. The results are stunningly obvious. Gradations are smoother. Light tones such as off-whites and skin tones show virtually no visible grain. Dark tones are richer, greys are more subtle than in conventional black ink.

Independent print heads can halve print time.

**Professional Resolution
Ultra-High Definition.**



Print up to A3. Both standard and PhotoRealism inks may be used on all A4 paper types. It will also print up to A3, and supports banner printing to the equivalent length of 6 A4 pages.

Canon Customer Care. All Canon printers feature a one-year warranty, upgradeable to three years for minimal cost, and are backed by unlimited hot-line support. To learn more call us on 1 800 021 167.



New BJC-5000 - \$599^{RRP} including 3 cartridges.

Canon



Making the Web deliver

If your business presence online is flailing, you probably haven't thought about it hard enough.

By Cathie Kennedy

At a recent conference, I spoke to a number of executives who were struggling to calculate the return on investment for their corporation's Web site. Many were convinced their site was making a difference, but couldn't prove it. This seems to be the result of rushing to establish an Internet presence without understanding the business economics, or developing a Web strategy, and without finding out what their customers want. These executives are continuing to sink big dollars and resources into their Web sites without truly understanding the benefits (if any) to date.

It was fortuitous then that one of the keynote speakers was the vice-president of electronic commerce for Federal Express — a company that has 1 million customers online, moves about 3.5 million packages, and conducts about 63 million electronic transactions per day. It has one of the largest distributed mainframes and client/server networks in the world. Although the company's first online venture was just four years ago, its Web site (<http://fedex.com/>) has over 14 million hits per month.

Federal Express' initial Web site was quite primitive. Basically, it allowed customers to track a package, and to find out about the company's services. Federal Express quickly realised that you cannot be stagnant in your approach to Internet commerce — it has to be fluid, it has to be interactive, it has to be global. As a result, Federal Express has developed five versions of its Web site in four years.

Federal Express has been successful because it works closely with customers and delivers value-added services. It understands the importance of alliances and the power of working with the supply chain.

For example, Federal Express is one of Dell's distributors in Japan, where customers can place a personalised order over the Internet and have a PC delivered within three days. Not bad, particularly

considering Dell's manufacturing plant is in Malaysia. The customer's order is sent directly to the manufacturing plant, where the specified CPU configuration is assembled and handed over to Federal Express, which air freights it to Japan through its hub in Subic. Standard components — monitor, keyboard, software and so on — are ordered simultaneously and are also sent to Federal Express in Japan. Federal Express receives a copy of the customer's order from Dell, and merges all the components into one prod-

new services, and provide added value to their customers.

Another example of exploiting the Internet to provide value-added services to customers is Kodak's PhotoNet Online. If you purchase a Kodak film and have it developed at an approved outlet, you can choose to have your photos posted digitally on the Web. When you collect your prints and negatives, you will be given an access code so you can view your photos on the Kodak Web site. Photos will be kept online for 30 days, during which time anyone with your

Executives are continuing to sink big dollars and resources into their Web sites without truly understanding the benefits.

uct. It even prints out new labels in Japanese. To store all the products, Federal Express has formed warehousing alliances in Japan.

It's a wonderful example of using the power of the Internet to move information, to take steps out of the process, improve customer service, and ultimately make the business more profitable. Both Federal Express and Dell believe that an effective logistics infrastructure is the key to success in today's electronic world, where national boundaries are no longer a restriction. How else would Dell be conducting about \$14 million of transactions a day over the Internet?

Now many will cry: 'We're not a Federal Express or a Dell! We don't have the same reliance on our supply chain.' Perhaps not. But the underlying principle is the same. Organisations need to use the Web creatively in order to stay ahead of the competition and realise a return on their investment in the site. The most successful businesses are those with the ability to turn ideas into new products and

access code can log in and view your snaps. The service has been available for over a year in the US, and a similar version is expected to be launched in Australia as this issue of APC goes to press. Queensland-based mail order processing outlet National Photos also offers a similar service.

Ultimately, the key to ensuring a return on investment is understanding how to capitalise on the potential of the Internet to provide innovative services to customers.

In a short space of time, the Internet has grown from a novelty to a true communications and commerce platform. Organisations cannot afford to simply throw bucket loads of money into the Web-development coffers and expect immediate results. Instead, they need to find ways to leverage the Internet to streamline processes, build customer loyalty, and generate repeat business.

Cathie Kennedy is a former editor of APC. She can be contacted at ckennedy@ozemail.com.au.

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Canon BJC-80
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Canon BJC-50
\$699^{RRP}



Advanced colour, cable-less communications, optional scanner plus two sizes that are

Small and smaller!

Canon has a wonderfully new idea for people that need a portable printer. A choice.

On the small side there is the BJC™-80. It is a fraction of the size of a briefcase. Yet, with its in-built sheet

Drop Modulation Technology.

feeder and power adaptor included as

standard, it is designed for people who have to produce high volume output from a very small printer.

Conversely, if size is critical, there is the brand new BJC-50 with in-built battery. It's not just small, at approximately half the size of the BJC-80 it's absolutely tiny.

Equally impressive, their performance is as big as their size is small.

Using Canon's advanced Drop Modulation Technology™ you can print everything from colour charts, to high quality photographs. Or, in seconds you can convert to extra high-speed black and white for finished business documents using the dedicated black cartridge with 128 print nozzles!

For greater portability, both models include an infra-red port for totally cable-less communications with any suitably equipped Windows® 95/98 notebook or PC.

And, if you really need the functionality of an office in the space of a briefcase, both models will accept an optional colour scanner head in place of the print

Cable-less communication.

head. It takes only seconds to change the heads. You can then use the scanner head to acquire colour images, or for fax and OCR functions.*

Canon Customer Care. All Canon printers feature a one-year warranty, upgradeable to three years for minimal cost, and are backed by Customer Care hot-line support. Drivers are available for DOS, Windows

3.1x/95/98 and Windows NT.

If you need help choosing between small, and smaller, give us a call on 1 800 021 167.



The BJC-80 fits in approximately half the space of a briefcase. The BJ-50 is approaching 50% smaller still.

Optional colour scanner.

Canon portable colour Bubble Jet™ printers

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Shop around when you buy a printer cable, or risk paying triple the price.

Parallel cables side by side

Most of us will use a parallel cable to print at some time, most likely in a small office or home environment.

Network printing has made the large-scale use of parallel cables in larger offices a relic of the past, and USB printers are threatening to do the same to simple parallel printing. USB is faster, theoretically easier to set up, and has no particular cabling length restrictions. However, most homes and small businesses tend to stick to the same old printer until it expires, so there is still a need for parallel cables. Most printer manufacturers don't tend to include a parallel cable in the box, partly as an up-front cost-saving measure, but also as an

attempt to limit ongoing expenses. The cable is often the guilty component when a printing problem arises, and the support of dud cables can become a costly exercise.

So if you've bought a new printer, or are troubleshooting an old one, chances are you will need to buy a parallel cable. No problem, you might think — they're a common item, and common computer consumables should be cheap, right? Think again.

A quick glance at the table below shows this simply isn't the case. Price Watch recently went in search of parallel printer cables, and was quite surprised by the wide range of prices vendors were charging.

Price Watch first visited some standard mass-market outlets. These places should be cheap — they have huge turnovers. As can be seen below, the results were extremely mixed. Kmart had the cheapest parallel cable we could find (\$8.98), and also stocked 'branded' cables that were difficult to find at other retailers. The trend is to dump a cable in an anonymous-looking plastic bag and slap a price tag on it. While there aren't many real name brands when it comes to cables, the manufacturer's details can be useful after the product is purchased. Large retail chain stores sell some of the most expensive cables around, and Dick



About Price Watch

Each month, Price Watch examines variations in retail pricing and service. Investigations are conducted anonymously, either by telephone contact with retailers or through pricing details supplied on their Web sites. Prices and specifications provided here are as quoted by retailers; while we assume these are correct, we cannot accept any responsibility for errors and omissions. The responsibility rests with sales staff to provide adequate information, as the company would expect them to do with every customer. Readers are advised to always obtain a written quotation prior to making any major technology purchase.

Smith Electronics topped the list with a cable costing \$25.95, about twice the average price.

Dick Smith was also the only shop in which we found a parallel extension cable openly displayed on the shelves. These may seem like a good idea, but beware. Parallel cables are notorious for losing data over distance, and you're better off making the distance between port and printer as short as possible. The longer cables in the table below might seem like great value on a per-metre basis, but if the extra length is only going to drop data out the window, this value quickly evaporates. Cables may have better shielding for longer distances, which helps, but it's virtually impossible to predict exactly how far a particular system should be from a printer before problems might arise.

Price Watch also contacted a few computer retailers and again prices varied widely, but many offered longer cables, which obviously cost more.

Although price differences aren't as large in dollar terms as in other areas Price Watch has investigated, they're just as significant. It seems that if the vendors can't sting you for a profit with larger, more competitive products (like PCs), they'll grab the money with smaller items which most people won't investigate too closely. As always, it clearly pays to shop around. ■

Parallel cables

| Retailer | Contact | Product | Length (metres) | Price |
|----------------------------------|----------------|---------------------------|-----------------|---------|
| Harris Technology | (02) 9925 9925 | Parallel cable | 1.8 | \$10 |
| International Software Warehouse | 1300 300 003 | Parallel cable | 1.8 | \$14.95 |
| Tandy Electronics | (02) 9267 1305 | Parallel cable | 1.8 | \$19.95 |
| Jaycar Electronics | (02) 9267 1614 | Parallel cable | 2 | \$9.95 |
| Dick Smith Electronics | (02) 9477 6633 | Parallel cable | 2 | \$25.95 |
| | | Parallel extension cable | 2 | \$32.95 |
| Kmart | (02) 9476 1966 | Office One parallel cable | 3 | \$8.98 |
| | | Fellowes parallel cable | 3 | \$9.98 |
| Grace Bros | (02) 9238 9603 | Parallel cable | 3 | \$12.95 |
| Harris Technology | (02) 9925 9925 | Parallel cable | 5 | \$17 |
| Bizz Wizz | (02) 9482 7746 | Avico parallel cable | 5 | \$19.95 |
| Harris Technology | (02) 9925 9925 | Parallel cable | 10 | \$26 |
| David Reid Electronics | (02) 9267 1385 | Wiretek parallel cable | 10 | \$29.95 |



Canon's patented new LIDE technology helps these new scanners break the price/quality barrier.

Reinvent is the most over used word in the computer business. But this time it's true. Canon has just reinvented scanners.

And not a little bit, but completely.

Introducing LIDE.™ Using a new, patented technology called LIDE (LED Indirect Exposure), we have fundamentally changed the way scanners work, and their price/performance ratio.

LIDE eliminates the need for costly, complex optical mirrors in image acquisition, while it maintains superior image quality and colour clarity.

Easy to use. At the same time, LIDE allowed us to design a smaller, sleeker scanner with an exceptional combination of beginner and expert controls, and with easy to connect (daisy chain) parallel port connections for Windows® 95/98 and NT 4.0.

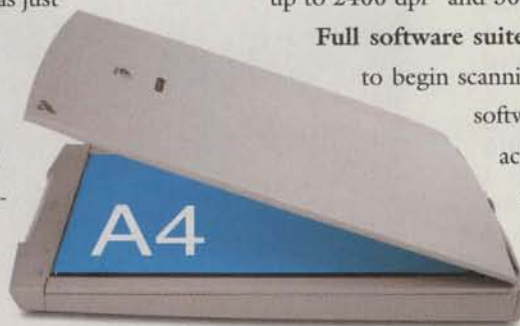
The new CanoScan™ FB 320P and FB 620P offer a choice

of 300 or 600 dpi optical resolution, plus enhanced resolution up to 2400 dpi* and 30-bit colour acquisition as standard.

Full software suite. Both come with everything needed to begin scanning immediately. The CanoCraft CS-P software works for both stand-alone image acquisition, and as a TWAIN driver for other applications. It features new, easier to use controls, and advanced controls for colour matching and image definition. Also included are PhotoExpress for image editing and OmniPage LE for OCR, a CD-ROM with full tutorial and user's manual, a parallel cable and power supply.

Canon Customer Care. The FB 320P/620P scanners feature a one-year warranty upgradeable to three years for minimal cost, and are backed by unlimited hot-line support.

The new CanoScan FB 320P and FB 620P. You can see they are different at first glance. To learn more call 1 800 021 167.



FB 320P – Now \$199^{RRP}

FB 620P – Only \$299^{RRP}

Canon

Incorrect information given to you by a company representative can lead to frustrating problems. By Roulla Yiacoumi

Stuffed around

In order to make decisions, we need information. Whether it is choosing an ISP, buying a computer, or even going on a holiday, we seek out information which will help us know what our options are.

But what happens when we are given incorrect information and consequently make wrong decisions?

APC received the following letter from a reader:

Dear APC,
I would like to share with you my frustrations with dealing with what is supposed to be the biggest and best ISP in Australia, OzEmail.

I have been registered with OzEmail for just over three years and have been very happy with the level of service I normally receive.

Only recently I became interested in developing my own home page. I took advantage of the 5M of free space offered to users as part of their OzEmail account. As I got more involved, I realised that I would very soon need more than the allotted 5M of space.

I sent an email to OzEmail asking what was involved in getting additional space. After three days I received an email back thanking me for my inquiry, and was sent details of the various pricing packages. Basically, it worked out at \$5 per megabyte per month.

I chose to get an extra 5M and asked OzEmail to charge it to my credit card, along with my monthly access fee which I was already paying. I made this request via email and thought that was all I was required to do.

After a two-week wait, I had heard absolutely nothing from them. I rang the customer service number and after a long wait, spoke to five different people before I got someone who could help me.

He told me nothing could be done until I filled in a credit card authorisation form, which he faxed to me. I signed it, faxed it back, and posted the original in the mail. I was told it would take 48 hours to make the space available.

I kept developing and uploading data to my home page and 10 days later



received a message back, saying my upload had been aborted as I had exceeded my 5M limit.

Nobody could help me on OzEmail's 24-hour help line, and I was told I would have to ring again on Monday morning.

First thing on Monday I started ringing. After finally getting through, I got passed from one department to another. I went through seven different people before being passed on to an answering machine, at which point I hung up. I tried again an hour later and finally managed to find a person who was willing to listen to my saga.

He was horrified by the run-around I was getting and faxed me a new set of application forms and asked me to fax them back to him direct. He said that he would personally deliver them to the right person.

On the following Wednesday I received an email from the original person who had faxed me the forms stating: "Thank you for your application, but sorry we no longer offer this service. I had not been made aware of this and therefore am unable to process it . . . Call me if you have any queries."

Australia's most popular printer for home and small offices combines exceptional value, with outstanding performance.

Use 75% less ink. Super Economy mode reduces ink consumption by 75% compared to Standard mode, and works for both black and white and colour. Combined with an optional high capacity, black ink cartridge, it can print up to 2400 pages in black and white, and up to 400 in colour using standard inks*. That's anywhere from two to five times the output of any direct competitor!

Photo quality printing. There are three colour print modes - Normal, Fine and Photo. Photo mode emphasises highlights and contrasts, and improves half-tones by producing richer blacks. Or, using the optional black ink cartridge, you can convert the BJC™-265SP to a fast B&W printer.



Brilliant colour, super economy, optional PhotoRealism, better Internet printing,

all for just \$169.

Optional PhotoRealism™ To this Canon adds the option of PhotoRealism inks, for photographic reproduction approaching silver halide quality. It produces up to four times the colour combinations of conventional CMY printers, for smoother colour gradations and more accurate colours in skin tones and other light shades.

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Canon Customer Care. All Canon printers feature a one-year warranty, upgradeable to three years for minimal cost, and are backed by Customer Care hot-line support.

Drivers are available for Windows® 3.1x/95/98 and Windows NT.

The BJC-265SP offers exceptional operating economy plus high quality colour printing, for just \$169. For more information call 1 800 021 167.



BJC-265SP colour Bubble Jet™ printer - \$169^{RRP}

Canon

* Based on 5% page coverage for B&W and 7.5% coverage for colour, Super Economy not available with PhotoRealism inks. Price shown is the recommended retail price including tax. Canon and the Canon logo are registered trademarks and BJC, Bubble Jet and PhotoRealism are trademarks of Canon Inc. Windows is a trademark of Microsoft Corp. in the U.S. and other countries. Canon Australia Pty Ltd, ACN 005 002 951.

Of course I had queries, so I rang him. Unfortunately, OzEmail staff don't give you direct numbers, and so I had to sit on the end of the help line for 30 minutes.

I was eventually told that the only way I could get more space was to use OzEmail's Virtual Web Hosting service. I didn't know what this was, so it was explained to me and the appropriate forms were subsequently faxed to me.

I started filling them out and found they referred to a domain name, which I didn't have. After another long wait in the queue, I was asked: "Don't you already have a domain name?" Yet another batch of forms were sent. I filled them in and faxed them back.

What started out as being an extra cost of \$25 per month for an additional 5M of extra space has ended up costing hundreds of dollars.

Bruce Sergent
Seven Hills, NSW

APC forwarded the letter to OzEmail and received the following response:

Dear APC,
On behalf of OzEmail, I wish to personally apologise to Bruce Sergent for the problems he has experienced with our company.

It is clear from Mr Sergent's letter and from the information provided that there was a

breakdown in the communication process both internally and externally. It would appear in this case that amendments to our virtual Web space products were not adequately communicated to the sales consultants Mr Sergent dealt with.

In a competitive marketplace such as this, we understand that the Australian consumer demands superior service and product quality, and as Australia's leading Internet service provider, we strive to provide this service and quality. This effort also means that our company has experienced exponential growth in recent times, and as a result, our staff numbers have more than doubled this year.

During the time Mr Sergent encountered problems with our company, we were heavily recruiting new staff for both our customer service and corporate sales teams to assist with the demand for OzEmail product and services, and we sincerely apologise for the inconvenience Mr Sergent suffered.

I can appreciate Mr Sergent's frustration, but it is important to note that he is now the owner of an OzEmail virtual Web site. Even though Mr Sergent may have experienced some teething problems, these issues have now been resolved and he is now enjoying a high-performance and robust network, backed by 24-hour, seven days a week technical support.

Prize winners

Congratulations to the following readers who have won prizes for completing the PC Service & Reliability Survey 1999 from APC February 1999:

John Edmonds
Wudinna, SA

Mason King
Herne Hill, Vic

Cherry Rankin
Bellbowrie, Qld

Len Linham
Ulverstone,
Tas

Eric Pearce
Berkeley, NSW

Each has won an Epson Stylus Color 740 printer worth \$599, an Iomega USB Zip drive worth \$349, and a one-year subscription to APC worth \$65. APC thanks Epson and Iomega for providing these prizes.



Has your ISP ever given you incorrect advice on which you made consequent decisions? Do you have any comments on OzEmail's response to the above complaint? Email me at ry@acp.com.au or write to Service & Reliability, APC, Level 8, 54 Park St, Sydney, NSW 1028.

I can assure you that Mr Sergent's experiences will be examined with a view to ensuring that we continue to improve business processes. I can only promise as OzEmail heads into the new millennium, our business will continue to expand and our customer service improve as we strive to maintain our hold on the leadership of the Australian Internet market.

Michael Ward
Vice-president, Corporate Relations
OzEmail

help return computer eyes to normal

>Restart eyes with Refresh™ eye drops
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Drop Modulation
Technology™

Optional scanner

PhotoRealism™

Super fast blacks

It can cut ink consumption by 75%, be used as a scanner, improve printed images down-loaded from the Internet, or even print banners. And this is in addition to better colour for plain paper, PhotoRealism inks for the gold standard in photo quality printing, plus super fast B&W!

Better operating economy. Super Economy mode reduces ink consumption by 75% compared to Standard mode, and works in both black and white and colour. It can print up to 3600 pages in black and white, and up to 400 in colour!

Better on plain paper. Another feature is Canon's Drop Modulation Technology with dual drop sizes for smoother colour gradations. It is designed to produce better looking colour on plain paper, which also helps keep operating costs down.

The PhotoRealism gold standard. When quality is most important, there is the option of Canon PhotoRealism inks. They vary the saturation per pixel so that a single dot could have 0%,

33%, 67% or 100%. This produces up to five times as many colour combinations as conventional CMYK inks, with better half-tones and almost no visible grain, even in areas of low colour density.

Super Economy
in colour and B&W

High speed blacks. A high-speed black ink cartridge with 128 print nozzles is included with your purchase.

It is capable of speeds up to 510 characters per second (4.5PPM)?

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BJC-4310SP colour Bubble Jet™ printer – \$239^{RRP}

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CS6013

New research suggests outsourcing isn't as big a money-saver as many businesses think.

Aussie companies still learning outsourcing

Australian organisations have been embracing outsourcing enthusiastically in recent years, initially spurred on by the success of major outsourcing deals involving the South Australian Government and the Commonwealth Bank (which recently reported that its \$5 billion outsourcing commitment had cut IT costs by 12% in the fiscal year 1997-98 and is expected to increase to 20% in 1998-99). This has driven quite substantial outsourcing commitments, such as the \$750 million deal between Cable & Wireless Optus and IBM Global Services, and the \$400 million Australian Taxation Office contract won by EDS earlier this year.

All told, the Federal Government has committed more than \$1 billion towards the outsourcing of most of its IT infrastructure, which it expects will reduce costs and provide a better organisational structure. Outsourcing vendors are riding the wave of increasingly larger contracts that, they say, indicate a new level of maturity in Australia's outsourcing market.

"Our [outsourcing] services business is growing at about twice the rate the market is growing [worldwide]," said an enthusiastic Lane Nonnenberg, US-based vice-president of sales and marketing with Hewlett-Packard's customer services and support group. "My eyes [have been] opened up with the sophistication of the [Australian] market; Australia is leading the world in the deployment of outsourcing across the board."

Craig Dower, director of marketing with EDS Australia, believes outsourcing has become a competitive weapon as Australian companies expand their markets overseas. "As a business trend within Australia, we've seen a much greater acceptance and level of outsourcing," he said. "Australian companies now need to compete on a more than Australian basis, and it's no longer acceptable for a business to be successful just by Australian standards. They need to compete globally, if not regionally."

Despite the large financial commitments that have defined the outsourcing market over the past year, commercial and government organisations need to work very carefully to ensure that they are setting realistic expectations and committing enough resources to managing their outsourcing providers.

It's a skill that most Australian companies still seem to be lacking, according to the recent Metamorphosis '99 Asia-Pacific Outsourcing Survey conducted by research firm Meta Group Asia-Pacific. The survey polled more than 100 Australian companies, and found that large companies (more than 5,000 employees) were slightly less inclined to outsource or to believe that outsourcing would provide reductions in costs. Large companies also expressed more concerns about security than smaller companies.

Although half of the survey's respondents expected to save money through outsourcing, Meta Group

outsourcer's business objectives. The outsourcer has an interest in providing as little service as possible to fulfil the terms of the contract, and may charge customers extra for activities that they feel fall outside the scope of the contract. The customer, on the other hand, wants to get the most value from their outsourcing spend. In the end, this disparity means most companies have been left feeling that their outsourcing providers are too inflexible to meet their changing needs.

Fortunately, companies can avoid this problem by clearly setting out the terms of the contract, methods for handling change, and charges that accompany certain activities before the agreement gets under way. Companies should also avoid revealing internal costs to potential outsourcers, and make sure their IT practice has been cleaned up *before* the outsourcer comes onto the premises, so they're not paying the outsourcer to do that dirty work.

Even more important, and often ignored, is the need to realise outsourcing isn't a set-and-forget practice; companies should commit between 3% and 7% of the contract value every year to managing the outsourcing relationship.

Committing adequate funding to outsourcer management is particularly important in the Australian market, where the outsourcing 'Big Three' — IBM Global Services, EDS and CSC — have a dominant market share over smaller and more niche outsourcing providers.

"I see more pressure on the big ones to ensure consistent delivery across the world," he said. "We expect IBM GSA, for example, to deliver equal service in Australia as in the UK, Europe and elsewhere. But because the competition is less here, they're using different techniques. Here, [service quality] is lower in the sense that they only push the IBM way; if you go for service management, for example, they reinforce Tivoli (an IBM proprietary solution) one way or another."

"They may be better at outsourcing, but they are not [working] to the level required consistently in other places in the world."

David Braue

Expectations and benefits of outsourcing

| Category | All companies | Larger companies (5,000+ employees) |
|------------------|---------------|--|
| Improved quality | 11% | 0% |
| Rapid change | 14% | 19% |
| Cost savings | 22% | 29% |
| Other | 24% | 19% |
| All of the above | 30% | 33% |

Source: Meta Group

program director Wissam Raffoul warns that cost savings are not necessarily part of the outsourcing equation. Many companies which have committed to outsourcing have saved money through the process, but companies should be prepared if outsourcing doesn't actually deliver such benefits, Raffoul said.

The problem, he said, is "a mismatch of goals" between the customer's and the

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Easy to use. To get you started, Canon includes image acquisition and editing software with your scanner head purchase at no extra cost! And using it, you can scan full colour or 256 grey-scale images in resolution up to 360 dpi. Or you can use high-speed mode if you simply want Black and White at 90 dpi,

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The portable BJC-80.



The even smaller, portable BJC-50.



The BJC-4650 for Windows and Macintosh and sizes to A3.*

Optional scanhead – just \$149^{RRP}

Canon

Does Australian law recognise the potential damage that illicit computing activities can cause? **By Leif Gamertsfelder**

Cybercrime gets nasty

In 1996, John Perry Barlow declared that the Internet was a new frontier that needed to remain free from the long arm of the law. Inevitably, this vision was quickly embraced by libertarians.

In some respects, Barlow's views are reflected in current 'cyberlaws' in Australia. Although federal and state governments have introduced 'light touch' legislation in many Internet fields, they have not yet flexed their collective muscles in one sphere of cyberactivity — unauthorised system penetration.

Only the federal and NSW governments have enacted comprehensive laws to deal with hackers. The federal laws relate to the unauthorised access of computers storing federal government data, and interference with that data. The NSW laws apply to all unauthorised system penetrations that occur in the state. Other jurisdictions do have criminal laws regarding 'benign' cybercrime, but these laws provide for lighter penalties in many cases.

A person that commits a 'benign' cybercrime (hackers who penetrate systems merely to crack security codes, but cause no damage to software or data files) may receive a two-year prison sentence under federal, NSW and Queensland laws. Benign cybercriminals based in Western Australia are more fortunate, as they will only be liable for a maximum of one year in prison if convicted.

Those who believe in Barlow's edicts will be pleased to know that there are some Australian sanctuaries for hackers. Victoria is one jurisdiction that has no specific laws relating to hacking or

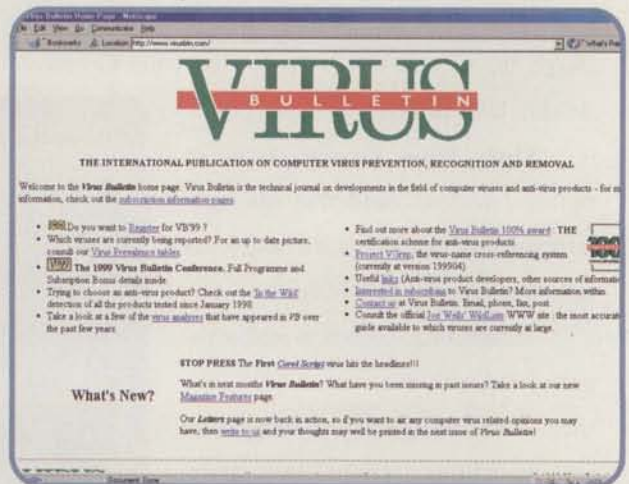
viruses. This is perhaps surprising given that Victoria plays a leading role in the development of other laws regulating Internet activity.

Another issue of concern for cyber-regulators is the penalties imposed for creating or distributing viruses. It is arguable that criminal laws which focus on unauthorised access could be used to prosecute individuals or organisations that gained access to certain systems without consent from the owner. For example, the recent penetration of 200,000 clients' systems by a Singaporean ISP would have been illegal in some Australian jurisdictions.

Viruses are more serious than amateur hackers because they not only involve the unauthorised access of a system, they can also cause serious damage. Viruses are increasingly causing enormous disruption to both private and public businesses. Two of the more notorious viruses of late are the Melissa (W97M_Melissa.A) and Chernobyl (CIH) viruses.

The Melissa virus (see APC May, page 22) can have a serious impact on an organisation's data security, yet not all criminal laws in Australia clearly punish the distribution of this type of virus. For example, the distributor of the Melissa virus may not be liable under Victorian criminal laws and may only be liable for a maximum penalty of one year's imprisonment or a fine of \$4,000 under Western Australian laws. This is because jurisdictions such as Victoria and Western Australia would be unlikely to heavily penalise individuals who cause or intend to cause damage to data or software by creating and distributing virus programs.

The situation is different in NSW, Queensland and in the federal government, as such a virus attack would trigger the hard laws these jurisdictions have enacted against cybercrime. A virus distributor convicted under federal or NSW law could spend up to 10 years in



prison, while an individual who breached Queensland laws could be imprisoned for up to five years. It is unlikely that the maximum sentence would be imposed in many cases, but those who distribute destructive viruses such as the Chernobyl virus can expect to face stiff penalties in these jurisdictions.

However, even the strongest Australian laws are lenient when compared to relevant US laws. The author of the Melissa virus now faces 40 years in prison and a maximum fine of \$US480,000 for distributing the virus.

The disjointed approach taken in the enforcement of cyber-criminal law in Australia is a consequence of the power-sharing relationship the federal and state governments have under the constitution. The federal government could introduce universal laws under the communications head of power, regulating cybercrime where criminal acts are committed over telecommunications infrastructure.

This would cover a significant amount of all cybercrime, but would not cover cybercrime committed over a LAN or at a standalone PC, because this doesn't involve using the telecommunications infrastructure. Still, it would be a huge improvement on the jigsaw of uncertainty we presently have.

Leif Gamertsfelder practises at Deacons Graham & James. He can be contacted at leif.gamertsfelder@dgj.com.au.

Links

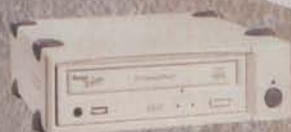
- For an overview of how the Melissa virus' author was caught, visit: <http://newswire.com.au/9903/mtrack.htm>
- For information on the Melissa and Chernobyl viruses, visit: <http://www.virusbtn.com/>
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Fortune magazine Dec 7 1998

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Constructing more efficient buildings is becoming easier, thanks to new technology.

Building a Gateway to the future

The Australian National University (ANU) is about to construct a revolutionary building at its Canberra campus designed to be responsive and sensitive to the environment. Developers say the Gateway, as it is known, will showcase leading-edge building technology solutions and provide a model for future sustainable design and construction.

As a working lab, the Gateway's aim is to provide a reference for products and systems for others to use in future construction and design projects. It will also house ANU's School of Resource and Environmental Management. Construction will take about one year, but will only start once an adequate number of sponsors have been found. ANU is seeking partners from construction, building materials and energy industries to supply products that can then be used and tested in the building.

The building will supply everything from wastewater recycling to energy generation, with no need for outside utilities. Many technologies will be used, not only to ensure adequate services, but also to monitor and reduce the amount of resources that will be required initially. Photovoltaic cells and wind generators are planned. In addition, natural light will be exploited to its maximum potential; for example, laser-cut glass that is etched to function like shutters that let light in and cut it out depending on the temperature. Timers and monitors will aid water and electricity conservation and the facility will use geothermal conditioning to tap into a constant underground temperature of 17°C in order to supply heating and cooling needs.

"The university really needs a statement like this building — the whole country does," said Professor Henry Nix, director of ANU's Centre for Resource and Environmental Studies. "We haven't given a great deal of thought to how to deal with effectively housing people, both while at work and at home."

Nix had the initial idea to create the Gateway. "I was horrified by the buildings being erected. There is little attention to orientation, natural lighting — basically we seem to put up the biggest possible shell with the dollars available.

It is very short-sighted and very expensive to maintain and operate."

Unfortunately, building an environmentally sustainable building is initially an expensive exercise, he said. The initial costs will drop as the demand for such goods and services increases, Nix said. This may already be occurring. Architecture firm HBO+EMTB has taken on the design of energy-efficient buildings such as the Gateway. HBO+EMTB director Lionel Glendenning said that initial costs are still a huge barrier, but interest in the use of new technologies to create sustainable buildings has increased.

"There are more materials and technologies available today, and there is also more interest in this type of building. The greatest change over the last few years is the change in the attitude of clients and manufacturers," he said.

Nix added that when the running costs of environmentally sustainable buildings are taken into account, it easily becomes cost-effective. The NSW Sustainable Energy Development Authority (SEDA) created its own 'green' office space within an existing high-rise in Sydney in 1996. Since the initial refurbishment — which cost no more than a 'normal' refit — SEDA has saved 36% on its lighting energy bills alone, said spokesperson Kim Kind.

Environmental designers say such 'whole of lifecycle' costs need to be considered in the initial design and construction process. In recent years, several forms of lifecycle assessment software have made this easier.

Che Wall, director of Advanced Environmental Concepts, which designs low-energy buildings, said buildings should not be designed to have too many technological dependencies, because that creates high maintenance costs; but they should use state-of-the-art technology to be environmentally sustainable. Wall's company uses software that allows designers and engineers to virtually construct buildings before they are physically erected. The software can also



test the building against simulated weather conditions.

"Five years ago, if I was asked to design/engineer a building that was unorthodox but environmentally sustainable, I would say no, you can't do it, it's too complicated to figure out if it would work," said Wall. "Now there is no limit. You can tackle the most obscure problems. A building like the Gateway could not have been done a few years ago. Now we can go for adventurous solutions and know they will work, and provide the lowest energy resources possible."

More opportunities exist in cases where buildings can be constructed from scratch, noted Glendenning. HBO+EMTB has been involved in both refits and new buildings. Old buildings that are refitted have old, often energy-hungry technology and usually no passive construction techniques are used. Conservative and ancient building methods are still often used today, said Glendenning. The fast-evolving nature of technology, as well as the need to make our buildings last longer, means that they need to be made more adaptable to change, he said.

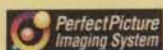
Nix said the Gateway building follows the 'long-life loose-fit' construction approach; it has been designed for easy dismantling and reassembly, and its interior has been designed to be rearranged to fit future work requirements. The size and basic style of the building is fixed, but Nix wants to leave the decision as to which specific technologies will be used until as late as possible, to gain the best equipment and services available.

Selina Mitchell



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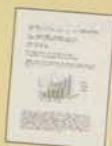


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Are you sick of a world where the only PC buying considerations are which flavour of Windows you'll install and which combination of beige and boxy you'll choose for your next system? Well, that world is changing. We're now closer than ever to compact and reliable software, desktop systems that won't clash with the lounge suite, and email that you can read from inside your sunglasses. SIMON VANDORE investigates.

DESIGN



Forget the estimated 90 million people who bought a computer last year: modern PCs are fundamentally flawed. They're big, they're square, they're ugly, and they sport OSes with more lines of code than is generally needed to control a thermonuclear missile.

Consider, instead, the possible alternatives: a headphone with a microphone and a clear plastic eyepiece that appears to suspend a private computer screen half a metre from your eyes, but doesn't block normal vision. A PC the size of a personal stereo attached to your belt, which allows you to read email on a crowded bus or monitor production statistics while you work on the factory floor. A Walkman-style device that exchanges files with

other listeners when you get bored with your current selection.

Even if you are working in an office, who needs a beige box on a desk? Take the little PC off your belt and connect a keyboard, monitor or anything else via USB, radio frequency or infra-red, and it's an all-terrain computer. Imagine the potential freedom of moving between your office and other parts of the building with a monitor or eyepiece automatically taking over as required. Or imagine being a gamer at a LAN party with one of these, while everyone else lugs along a minitower.

In a decade or two, it will be fascinating to look back on the heady days of the early 1990s, the boom time for futurist magazines like *Wired* and *Mondo 2000*, when the Internet was first opened up to the non-academic, non-military world and everybody was making predictions

about 'information superhighways'. Everything was going digital, they said, from cars, to carpets, to clothes.

Not all these ideas translate very well into reality. Long-term users of 'wearable' computers report serious mental side effects. Whether the display involves goggles, a monocle or a pair of adapted sunglasses, the wearer often reports symptoms like greatly reduced attention span, problems with vision, and flashbacks. Steve Mann (nicknamed 'Web man walking'), professor of electrical and computer engineering at the University of Toronto and one of the most dedicated advocates for wearing computers, warns that there are possible hazards from long-term exposure to radio frequency energy. There may also be the threat of brain damage from living in such an altered reality, even without disturbing the senses of touch, taste and smell.

It may be quite a while before wearable devices enter our daily lives. Phil Hester, IBM's vice-president for systems technology — "That means I'm a card-carrying geek," he told APC — understands that his 300g wearable PC (233MHz Pentium MMX, 64M RAM, 340M hard disk and handheld trackpoint mouse) is a natural crowd-puller, but he prefers to introduce it in the company of other upcoming devices. It's harder to explain the potential market for something as radical as a PC that has escaped its square-edged rectangular case.

Maybe, though, the goal of putting a full-powered PC in everyone's pocket is just a distraction — why not wear a device in your shoe that logs you in automatically when you enter a wired building? A PDA in your jacket lining? An automatic news receiver in your front pocket? These devices could conspire to send information via radio frequency to your monitor-capable spectacles and subtle earpiece as required. Many of the functions performed by such wearable computers don't really require video, so the side effects of trying to use wearable computers in traditional ways could be reduced if the computer was purpose-built, rather than an adapted PC.

Here we cross over into mobile phone territory.

Companies like Nokia and Ericsson are busy working on high-bandwidth, third-generation, or 3G, wireless devices which double as PDAs. (See page 109 for more information on 3G standards.) Combine the personal stereo-sized PC with a 3G phone and you have the 21st-century universal companion. It would be voice controlled, a descendant of the current models that dial your friend's number when you say the appropriate word or name. Using wireless communication standards, it would conduct EFTPOS transactions, receive email and arrange dinner dates, all while serving a Web site.

Pision, Symbian, Sun and Alcatel are working on a range of intelligent phones and handheld computers that will use Java and Symbian's EPOC operating system. Sun CEO Scott McNealy has predicted that as many as 60 million devices will use these technologies by 2004.

Microsoft, Philips and Panasonic have a rival technology running Windows CE — a touch-screen, Internet-enabled phone codenamed Hermes. Compaq is striking out on its own with the Arrow 2100, a handheld multimedia and communications device.

If you want to get ahead of the game, a \$700 device called the InfoGear iPhone is already available in Australia — it's a GSM mobile phone with a screen large enough for using the Web and reading email. An additional charge of \$24.95 per month applies for just 10 hours' Net access, so it's not cheap, but what price can you put on the future?

Meanwhile, back at the desktop . . .

All this emerging new technology doesn't mean desktop machines will disappear entirely. The next wave in everyday PC form may be a modular device which can operate as a notebook, a touch screen tablet or a desktop PC. It achieves this by separating the screen and keyboard, allowing them to be combined in different ways. Prototypes already exist and you should expect to see them on the market soon, though we will need a new word to describe them.

On the train, it could sit on your lap. At a meeting, it could act like an oversized PalmPilot, sitting flat on a desk and allowing you to take notes with a pen or browse spreadsheets and graphs. On your desk at work or at home, it might be best to pull the thing apart, hang the monitor at a healthy height for your neck and slide the keyboard across your desk

to a more comfortable typing position. Then you could slot it back together without the keyboard in the kitchen and use it as a television while you peel potatoes. This is just one example of how PC designs are evolving from the conventional beige box (see 'Does it come in hot pink?' on page 78).

But is the PC as we know it therefore dead? The best way to answer this question is to ask the same of other computing paradigms. Is the mainframe dead? No. Are midrange systems dead? No. Is the abacus dead? No.

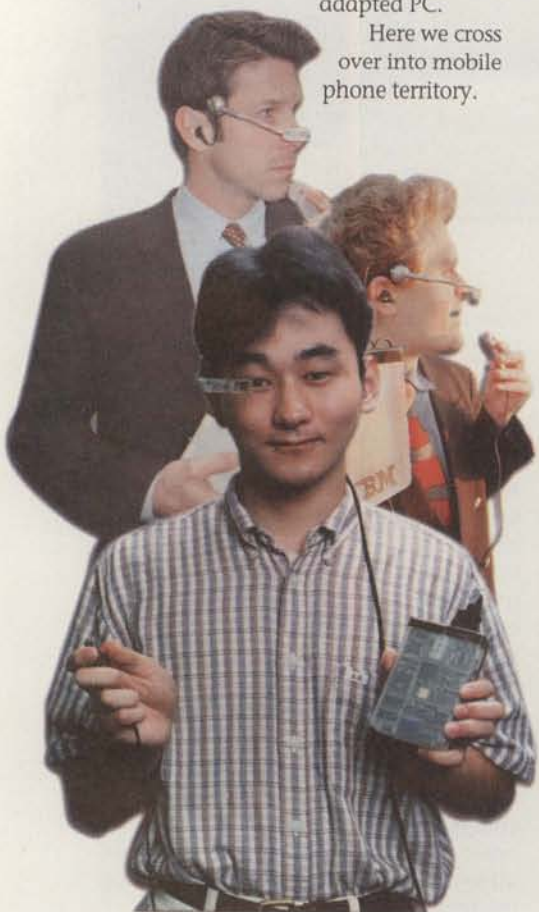
The type of device we currently call a PC will be with us for quite some time. Perhaps it's just that another new species of computer is emerging alongside it — if we define leaps in processing power and storage space as 'generational', then we have to view the leaps between the mainframe and a wearable system as an evolutionary process. The differences between generations are seen in what we are able to do with the machines and under what conditions. Aside from scale, each has the same basic capabilities as the last, but broadens the scope of potential interaction between human and computer.

Modular devices that are equally at home in the kitchen, the office or on the road can be made to store databases or corporate spreadsheets and even act as terminal servers, but a mainframe is not much use at the beach (despite all the silicon).

So far, PDAs have been complementary to computers; users link their Palm Vs and Cassiopeias to their PCs to exchange data. But this distinction is blurring fast, thanks to categories like subnotebooks, mininotebooks, smart phones, TVs with Internet access, MP3 players and entertainment consoles like Sega's Windows CE-capable Dreamcast (see 'Kick back and compute' on page 76 for more details).

At some point it seems there must be a narrowing of the categories, but IBM's Hester told APC he expected a central control point to emerge, rather than a reduction in the variety of devices. This epicentre would more than likely still be the PC in some form, but it remains to be seen whether consumers will accept that a wearable or multifunction PC can also be a central server. Perhaps the best idea would be a docking station on the wall by the door, where the PC could run the house until it's needed elsewhere.

One of the most interesting places to find informed speculation on these matters is Compaq's weekly *The Rapidly Changing Face of Computing* technology



journal (<http://www.digital.com/rcfoc/>), which was originally an internal newsletter at Digital. Here, senior consulting engineer Jeffrey Harrow (another card-carrying geek) summarises the innovations and trends that will shape future products, and it can be accessed in print or via RealAudio.

All these new developments need is a market. Perhaps people who like to assemble their own machines will start the boom. Wearable computing began this way, in the form of rebellious MIT and University of Toronto research projects.

Today, ATX-sized cases, PCI slots and CPUs with giant heatsinks form our image of what is inside a PC. Plenty of expansion cards don't actually need all that space — many soundcard and video card manufacturers now save as much plastic as they can and fit everything onto a reduced-height or half-length card clinging to its faceplate. If you've ever added extra RAM to a modern notebook and have seen how easy it can be to actually slot the little pieces together, you might wonder why it is that we're still stuck with boxes bigger than the original 8086 clunker. As long as the air inside the case is kept cool and gently circulating without creating too many side effects like noise and concentrated exhaust, a fully functional computer can be made very small.

For the moment, those who like to build computers themselves aren't too concerned about size — heat dissipation is only important due to a rash of over-clocking. But if wearable computing



were to find a killer app, things could change fast and the price of smaller components would be sure to drop as a result. Today, smaller still means less powerful or reduced capabilities to keep costs down.

Thin is still in

One area permanently on the cutting edge of design is the thin client industry, predicted by some to be a \$10 billion market by 2001. Because a thin client is just a terminal that transmits and receives mouse-clicks, keyboard taps and display information, designers can have a field day with cheap form factor experiments. There are thin clients in the form of computers, PDAs, televisions, keyboards, expansion cards and any other shape that suits the intended function.

A full computer can be used as a thin client while it performs other functions, but a dedicated thin machine might run Linux, DR DOS, Mac OS, or Windows CE

— the operating system becomes irrelevant once a server session is activated. It is reduced to just another factor in the design of the device. Theoretically, thin clients could exist in refrigerator doors, book covers or even teddy bears; wherever it makes sense to have a cheap terminal hooked back to a central machine.

When logged into a server running Microsoft's Windows NT Terminal Server Edition or Citrix's WinFrame or MetaFrame products, a thin client appears to be a full computer running a Windows NT session. It's the same old concept as connecting to a mainframe database or Unix system from afar, but general familiarity with the Windows environment and the amount of available applications means the reinvention of thin is now an attractive option for IT departments. Some predicted thin computing was destined for an early grave, but consistent profits among companies in the industry, along with the licensing by Microsoft of Citrix's ICA (independent client architecture), have seen it develop fast.

Bandwidth requirements are low (even a 9,600bps modem connection can be enough), and many people don't realise they're working on a remote system. Best of all, network administrators can make each desktop identical in its basic configuration, reducing the total cost of ownership.

The network computer (NC), an alternative promoted by Sun also using the word 'thin', fell halfway between a thin client and a desktop PC. Instead of

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kick back and compute

As any teenager can tell you, computers are used for much more than work — they can be pure entertainment machines. The emerging trend is fairly strongly against the familiar box in the corner. A number of technologies descended from the PC are merging with more mundane home entertainment systems and the future looks set to further blur the distinction.

On a simple level, the explosion in the use of MP3 as a file format has led to a rash of portable MP3 players. *APC* has already looked at these in some depth (see January 1999, page 42). Smaller than a Walkman, with a similar battery time, they're ideal for portable music and — despite legal challenges from the Recording Industry Association of America — are becoming widely available. But you still need a PC to download the files before you can play them.

For entertainment purposes, the trend is towards merging computers and television. Some attempts have already been made in this direction (for example, the Cybernet PC TV, reviewed in *APC* March 1999, page 38). Essentially,

though, this is a midpoint. Hot on its tracks is the Sega Dreamcast (see *APC* June 1999, page 42), a gaming console with a Windows CE flavour and Net surfing capabilities, which gives a good insight into where entertainment and computers are heading. For the non-computer-literate crowd, these types of machines are ideal — play a few games, surf the Web, and then click over to another exciting episode of the *X-Files*.

No OS knowledge is required, just a little hand-eye coordination.

The introduction of digital television (set to debut in Australia next year) will create an incredible number of related opportunities. The specs for HDTV allow for a staggering 19.3Mbps of data transfer. Not all of that is going to be taken up with endless repeats of *M*A*S*H*, although it may take a while for datacasting options to emerge.

And what of the longer term? In the

rush to merge computer capabilities with familiar entertainment objects (be they TVs, consoles, Furbies or whatever) we can expect the box-with-monitor concept to change dramatically. As lounge-room items, home computers will tend to sport sleeker designs with nary a hint of beige and they will be much tidier and less obvious as features of your home. Small is king for entertainment devices —

Diamond's Rio MP3 player is about the size of a packet of cigarettes, while the Dreamcast is less than



The 20cm by 20cm Dreamcast is an entertainment device with Net access.

20cm by 20cm.

But are these just entertainment options with computer pretensions? Well, most major IT players have some sort of investment in entertainment computing — you only have to look at Microsoft's heavy investment in WebTV. They may not be computers in the way we understand them at the moment, but they definitely point to a converging PC-style market that is still in its infancy.

Alex Kidman

placing the application load on a beefed-up server, NCs download the latest versions of applications as required and then run them on the client — this means the client is still cheaper than normal, but the server doesn't take such a hammering. However, it requires applications to be rewritten for the purpose of network computing, usually in Java, and as a result NCs proved less of a success and many have ended up being used successfully as Citrix-style thin clients. Sun's own JavaStations were adopted en masse by the NSW Roads and Traffic Authority (RTA) in late 1997. In fact, the RTA bought 896 of them with 100MHz MicroSPARC processors, 4M RAM and keyboards featuring OCR and magnetic stripe capabilities, costing about \$1,000 each.

Chief architect for Java systems at Sun, Bud Tribble, defined 'thin' in his company's internal newsletter as follows: "The thin client has no permanent state stored physically on the desktop. All the applications and data are stored back and managed on the server. That moves a lot of the complexity off the desktop and puts it back in the server,

where it can be professionally managed for a lot less money."

Companies like Wyse, NCD, and smaller ventures such as Australia's Stone Microsystems and Austone Technology, each produce entirely different definitions of 'thin client'. For example, Wyse produces a wireless Winterm tablet that runs Windows CE and uses a pen for data input; it's designed for use in hospitals and other environments where staff

ness. Similarly, individuals could buy access to applications they wouldn't normally be able to afford and which their cheap home thin client or aging PC could not run on its own.

Citrix president Mark Templeton even uses thin clients in his house. Templeton wired his home with Category 7 cable, giving it 25 network ports and an ISDN connection to the Internet. At the time he spoke to *APC*, Templeton was planning to

The network computer, an alternative promoted by Sun, fell halfway between a thin client and the desktop PCs most of us now use.

are always on the move. Stone produces cards that allow up to 32 users to work using a single PC.

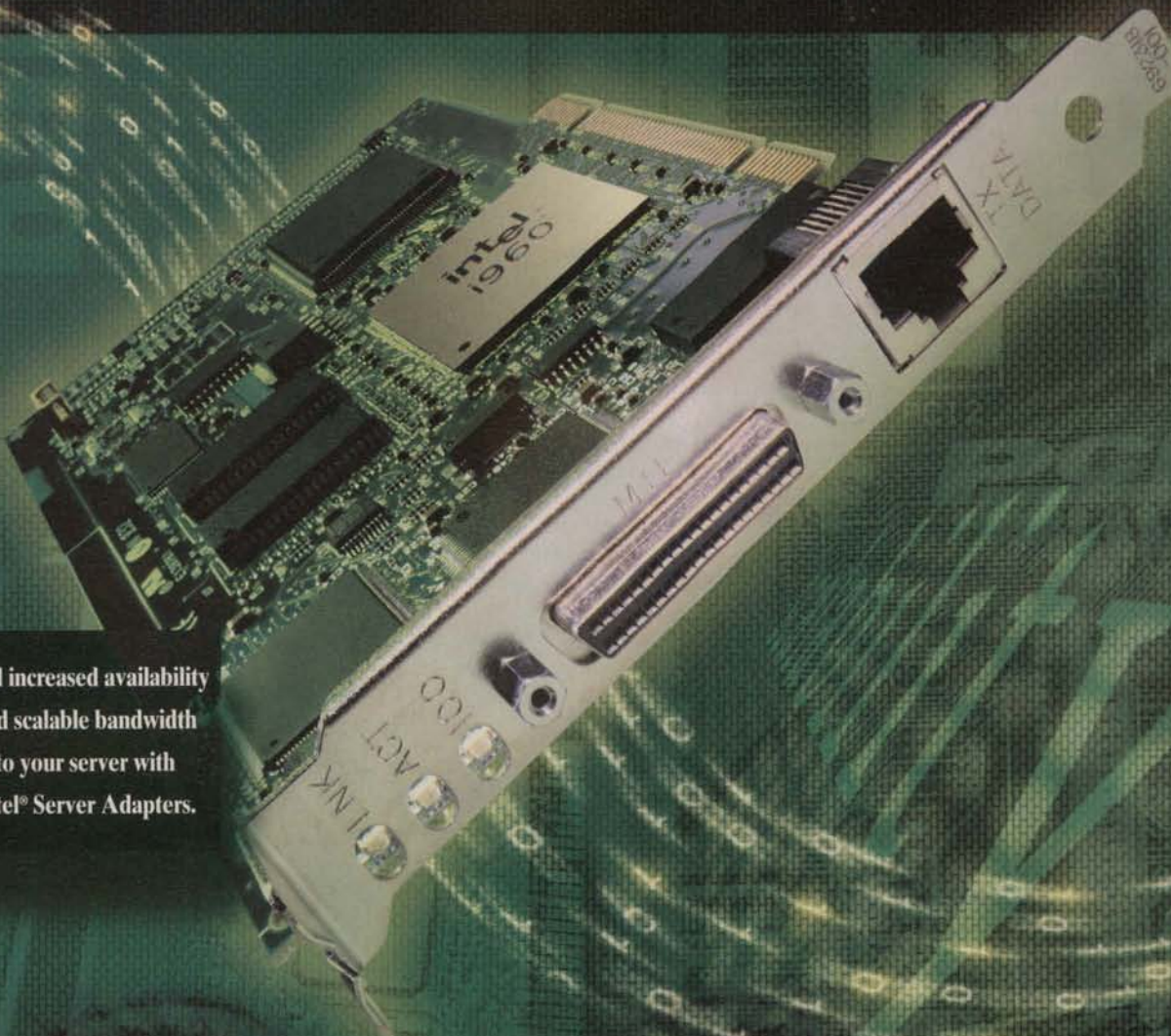
Citrix recently started promoting the idea of outsourcing server management using thin client technology — companies running 'server farms' could rent time and space on NT servers running the applications that others use to do busi-

ness. Similarly, individuals could buy access to applications they wouldn't normally be able to afford and which their cheap home thin client or aging PC could not run on its own.

install a MetaFrame server in his home office, but this doesn't mean everything in his house is thin.

"My children have PCs and they're going to continue to have PCs," he said. "I want my children to have the experience of breaking the configuration and having to fix it, so they have knowledge about it." Thanks to their interest in

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Does it come in hot pink?

Although some early (pre-IBM PC) personal computers came in distinctive colours and designs, things have been rather boring during the last decade and a half. Despite a few attempts to brighten things up, Apple is the first mass-market vendor to bring a fresh look to its entire product line, rather than just a single machine or model.

The mid-1990s Acer Aspire series tried to introduce a bit of style by going all black and curvy, but at the expense of specifications and the ability to upgrade. The iMac's translucent plastic look (and *that* round mouse) has changed attitudes, but the best other manufacturers seem able to do at the moment is come up with matching accessories. Like stereos, TVs and VCRs, PCs are now widely used for entertainment.

However, as most of these other devices come in black by default, the PC continues to look out of place. Notebooks are the obvious exception, but how many people can afford one for home use?

Jonathon Ive, Apple's senior vice-president for industrial design, believes the industry's focus on chip speeds and other numeric measures has excluded much of the general public. This was a major factor in Apple's decision to introduce a new range of colours and designs, first seen in its iMac line introduced in January.

"What I think is so interesting about colour is that suddenly that's a very accessible thing that we can all talk about. It's very democratic," he told *APC*. "[We] got a very clear message quite early on that people wished there was choice [of colours]."

But the decision about which colours would be offered was less democratic: it was made by a small group including Ive and still-interim CEO Steve Jobs. Ive has little time for focus group testing, which he describes as "an insurance policy for people who don't want to take the risk of making a decision"; in particular, focus groups "are a comment on today, but

generally you're designing for tomorrow" and because "they really guarantee that you don't offend anybody, they ensure that you don't truly innovate". And so Jobs and his cronies chose the potentially offensive shades of blueberry, strawberry, lime, tangerine and grape (that's roughly blue, red, green, orange and purple) for lounge rooms and studies around the world.

Design for living

There's more to it than colour, of course. Ive believes other aspects of design will allow non-technical people to establish a relationship with a highly technical product.

Consider the iMac's handle, for instance. "The majority of people actually find this sort of product very threatening, very terrifying. And I think the idea of putting a handle on is that it makes a direct reference to the hand and when you look at it, you understand it. If there's nothing else you understand on the entire product, you'll understand the handle."

Sounds a tad unlikely? Ive visited a store with some colleagues the night the original iMac went on sale to see the public's reaction.

"Absolutely everybody, without exception, touched it and held the handle," he said.

Despite advances in the iMac, Ive still believes insufficient attention has been given to the actual nature of a computer. Unlike, say, a pair of scissors, a computer's function varies: one minute it's a typewriter, the next it's a video editor. "The idea of constant change is a characteristic of the natural world and is reflected in the iMac design. What we were trying to do was make [computers and monitors] appear more fluid, to appear more vital, to not be architectural, to not be rooted to one spot. The natural world actually is translucent, skin is translucent..." Ive

also suggested the design of forthcoming Apple products would reflect similar concerns.

One *APC* staffer who builds his own computers spent months trying to track down cases more worthy of his high-horsepower creations. In the US it's often possible to find a clear or wooden case, but they're quite rare in Australia — he's taken to spray-painting beige cases black and is considering employing the talents of an artist for his next one. Gateway and some other makers have adopted white, but grey and beige still predominate. Even the research supports a change — in the US, Apple found that consumers were more likely to believe a black computer was faster than an identical machine in standard beige.

Visual appeal isn't always important in the corporate environment, so boxy beige is an easy default. Recent surveys show that 45% of Australian homes and more than 50% of US homes have PCs, but somehow the corporate look has persisted. As minor a

point as it may seem to experienced users, beginners find this a turn-off. It perpetuates the myth that computer 'experts' live in some kind of unattainable realm — they must because their machines look other-worldly.

But aping the iMac probably isn't the answer either. Apple's Ive fears other companies will focus on some of the styling features of current models such as the translucent colours and produce some "absolutely terrible" designs. "I think that's to so miss the point, so gloriously miss the point, that if that's what we're surrounded with... it'll be a real shame," he said. "Without design integrity, I do worry that we're going to see some very dodgy stuff coming."

Stephen Withers and Simon Vandore



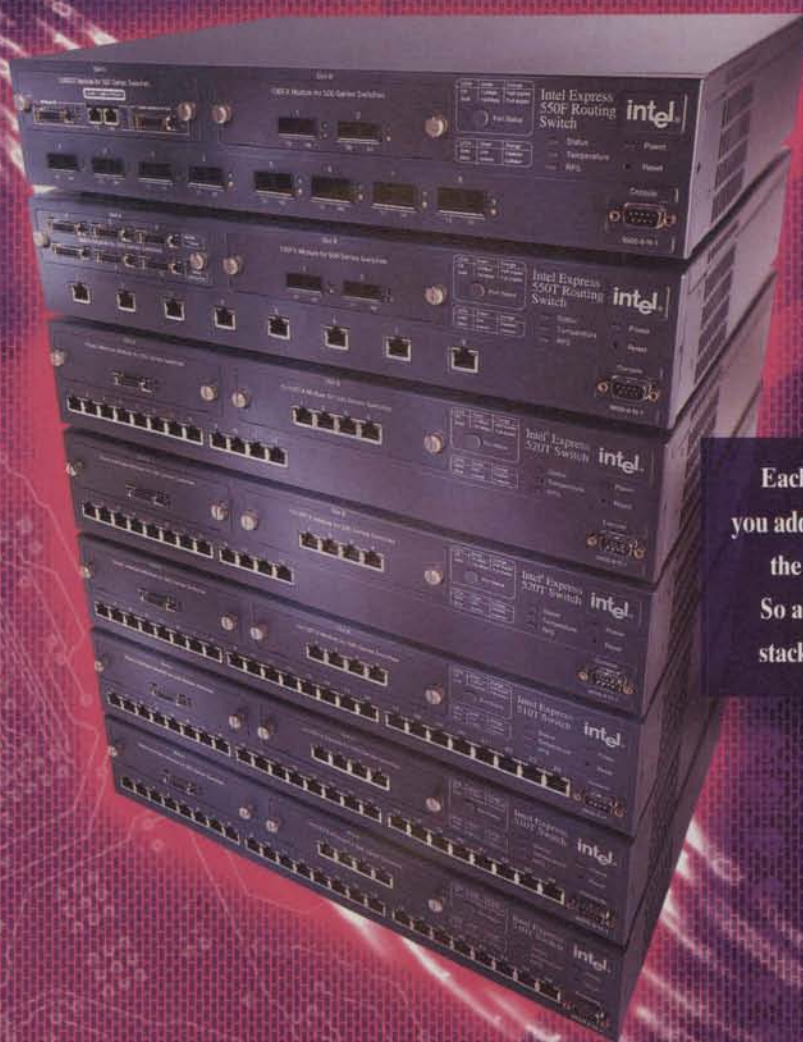
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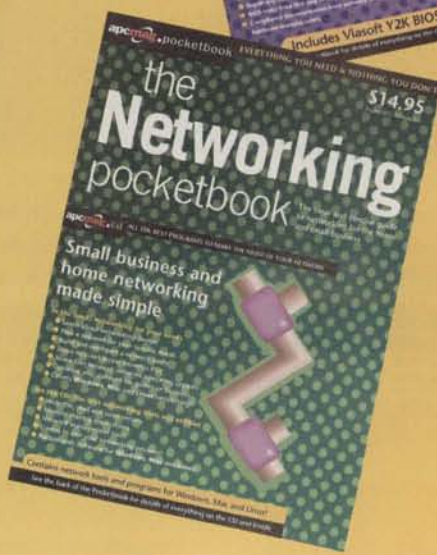
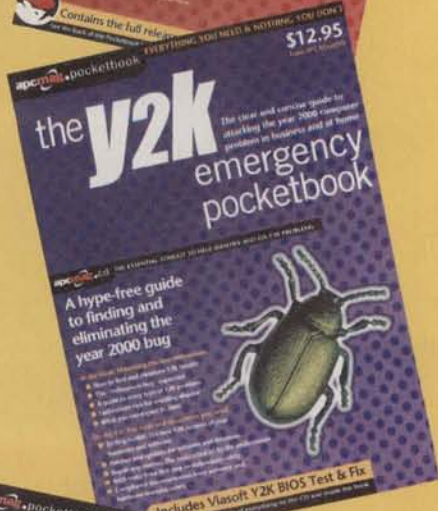
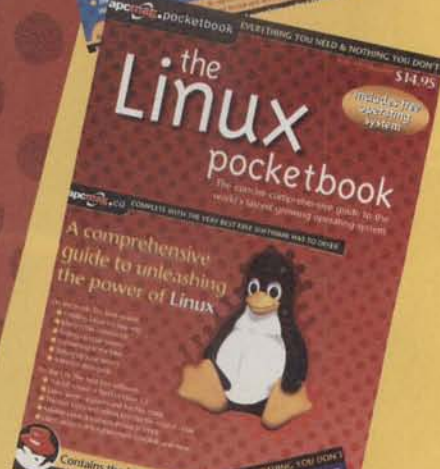
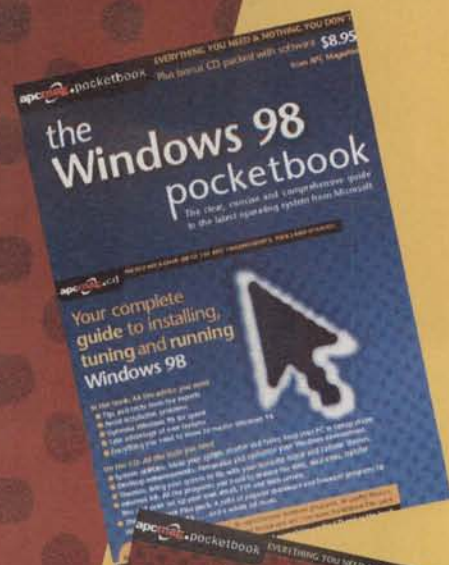
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games, the kids already have a habit of breaking the configuration and using emergency recovery disks, so the MetaFrame server hosts their Microsoft Office applications, saving a full reinstall on each PC.

"Another thing I'm doing is empowering my family room with Internet browsing by putting one of those [thin] set-top appliances in there. In the kitchen, I'm putting a flat touch-screen terminal. I want [to use it] as a family information manager and a family calendar. And Internet access for news, like a PointCast-type thing. So that [it's]



Is this laptop bringing value to this kitchen?

always alive, and bringing value into our kitchen. But I don't want word processing in the kitchen! There won't be a mouse, it's all touch screen."

If this concept were to take off, the way would be cleared for innovations in computing form and style to quickly become commonplace. The current focus on buying expensive, full-scale PCs for the home doesn't leave much room for experimentation — thinner, cheaper and ultimately disposable devices are more likely to be made in form factors that suit their intended function, or could even become fashion accessories.

Even as early as November 1998, when he visited Australia for Networld+Interop, Templeton carried a cheap notebook-shaped thin client which already had some of the foldable, rearrangeable features now being proposed by IBM for mobile PCs.

There are other devices designed specifically for networks, such as the iMac, which shares its lack of a floppy disk drive with most thin machines. But does this mean that if an item can't be networked, it is useless? No, but it's less useful because it isn't as adaptable to

new types of computing situations. Plenty of iMacs are currently stand-alone and their users appear quite happy, but Apple is betting this won't always be the case.

Descendants

Where do we go from here? Exciting technologies which are yet to really merge with computing include nanotechnology (fully functional, microscopic machinery) and biotechnology (genetic modifications that can include direct connections between humans and machines). These will have a significant impact on form when they arrive.

Nanotechnology is currently more the domain of mechanical engineers than computer designers. But the same thinking that goes into making tiny turbines might also assist in extending battery life or recharge rates. Mobile users are still tied to the electricity grid by the need to recharge every few hours, and the only solutions currently available are solar energy and the recent reinvention of clockwork power. The famous Freeplay radios invented by Trevor Baylis of BayGen (<http://windupradio.com/>) have spawned wind-up torches and experiments with powering notebook computers. There's also some talk of applying kinetics to wearable computing — several watts of power can be generated by a brief burst of exercise and used to power the machine.

Most current images of biotechnology tend to focus on the controversial aspects associated with genetically modifying food, but the science may also impact IT design in the future. The villainous Maas Biolabs in William Gibson's sci-fi literature produced 'biochips' — organic computers made of purpose-engineered cells that were much more capable than anything made of silicon. The complexity of human brains is still so far beyond computer science that biological processors may become a realistic avenue for researchers hamstrung by today's semiconductor technologies — scientists at NASA's Microgravity Research Program (<http://microgravity.nasa.gov/>) can already create simple information storage reactions between cells.

All of these technologies have the potential to create PC designs radically different from current forms. A self-powered, biological workstation would certainly redefine spreadsheets. But who knows? Perhaps biochips are beige. ■



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'I will never buy that brand again'

A bad experience with a retailer or manufacturer often leads us to seek alternatives when making future purchasing decisions. Conversely, a good experience may result in repeat sales and recommendations to our friends. In APC's PC Service & Reliability Survey 1999, readers were asked what IT brands they use, how reliable their equipment is, and whether they would buy a certain brand again. Almost 1,000 readers completed the survey, and the results make interesting reading. **BY ROULLA YIACOUMI**

Products and service: What our readers really think

There are handheld scanners, sticky mice, flimsy joysticks, complicated tape backup units, dodgy modems, and mountains of software in hundreds of homes across Australia. The majority of these products are out of action. They have long been discarded due to their inability to perform correctly, if at all. They certainly didn't last long enough to justify their initial purchase price.

We have all had bad experiences with products that didn't live up to our expectations. Not many of us would be prepared to buy that product a second time, or even give that particular manufacturer a second chance.

It doesn't take a disastrous experience to swear off a product for life. It may be that a product is unreliable because it is badly made. The packaging could promise the world, but the product may simply not be capable of performing to the level specified. It could be slack after-sales support that lets us down — no-one returns our calls or emails or we have to wait 30 minutes on the help support line.

For the manufacturer, bad products and bad backup support could spell eventual doom. It's one thing to lure a first-time buyer with a low price, but second-time buyers know what they want — and it's not necessarily a cheap product. The comments readers sent with the survey indicate that second-time buyers

are far more educated and discerning; they may have learned the hard way.

What do we want when we go shopping for an IT product? That's simple: a product that does what it promises. We want a well-made, reliable product. If something goes wrong, we don't want to hear excuses — we just want the product repaired or replaced. We want all this and we don't want to pay the earth for it. Essentially, we want good value for money.

The trade-off

Judging by what APC readers said in this year's survey, many have ultimately been disappointed as a result of buying the cheapest product available. According to the survey results, price is the greatest deciding factor in buying a particular product. First-time buyers shop around using price as a determining factor above all else — above quality, service and reliability. Yet, it is a combination of quality, service and reliability that matters most to repeat buyers.

As an example, let's look at a basic PC component such as a mouse. The difference between a \$15 mouse and a \$60 mouse may be a lot in dollar terms, but in practical terms may not be. Judging from the responses APC received, there are an awful lot of people with cheap mice that are useless after a few weeks.

Buying a cheap mouse once convinces many people that it's worth spending extra for a better one. In the end, of course, it means you pay up twice.

Our survey, which was published in the February 1999 issue, also asked readers about the PC they used most. How and where they bought it, how reliable it was, and if they'd ever buy that brand again.

To the vendors that won over APC's fastidious readers, congratulations. We hope that you will continue to improve your products and customer support. It should be noted that the survey results were collated by an independent data processing firm.

Thank you to the 990 readers who responded to our survey. Without your feedback, there would be no survey findings. Your responses will be read by countless others who will take your comments into account. APC readers are in the best position to spill the beans on the best and worst IT brands and products. They have a keen interest in computers; they are home users, IT managers and everyone in between. The one passion APC readers share is technology. They are the people approached by friends looking for technical or purchasing advice. Most importantly for the PC Service & Reliability Survey, they have dabbled in a number of products and know what works and what doesn't. Read on...

Personal computers

Do APC readers buy brand name PCs, or do they prefer clones?

The answer to this question is a little complicated. About 28% of respondents said the computer they used most often was a brand name PC. Similarly, 30% of respondents said they used a clone. Notebooks are used most regularly by 5.1% of respondents and almost all used 'brand name' notebooks. However, a significant proportion of readers selected 'I had the computer built from parts I specified' (14.9%) or 'I built it myself' (21.7%).

The high number of respondents who built their own computers would appear to reflect the technical expertise of APC's readership. Further, it seems that a large proportion of APC readers are not content with standard machines from either brand name or clone manufacturers, and many of them prefer to assemble a quality box from carefully selected parts. Of course, for those building it themselves, it is also considerably cheaper and any mistakes made along the way are good learning experiences.

When we asked about the location of the computer used most often, 86% said it was their home computer, while almost 13% of respondents said it was a work computer. A large proportion of home users also noted their PCs were sometimes or regularly used for work.

PC brands APC readers use

- 1 Gateway
- 2 Compaq
- 3 Dell
- 4 IBM
- 5 Acer
- 6 Hewlett-Packard
- 7 Toshiba
- 8 Apple
- 9 Edge
- 10 Digital
- 11 Packard Bell

Source: APC PC Service & Reliability Survey 1999

Brand names under the microscope

We analysed the results of the top five (in survey respondent number terms) brand name PC manufacturers nominated, and they are shown in the box 'APC readers rate the brands' on this page. Among other things, these results indicate that even though someone uses a particular PC, it doesn't necessarily mean they are happy with it or that they would buy it again given the choice.

Of the brand name PCs respondents said they used most often, **Gateway** topped the list. Almost 80% of Gateway owners also said they'd be happy to buy another Gateway machine, and nearly 90% of Gateway users rated their equipment either 'very good' or 'excellent'.

According to APC readers, the poorest customer service came from **Compaq**; 25.9% of Compaq users described the support they received as 'poor', compared to the overall average of 14.5%. But Compaq did register better performance in other areas such as reliability of equipment; 72.5% of Compaq users described it as 'very good' or 'excellent'. Compaq is currently the world's number one PC vendor in terms of units sold.

Dell machines impressed their owners the most in this survey, scoring highly across the board. Dell was ranked as the most reliable ('very good' or 'excellent') of all the brands (97.4%) and the brand most likely to be bought again (94.7%). Of Dell owners, 71.1% said their machine had never been out of action.

Of the **IBM** users, 70.2% rated their equipment as either 'very good' or 'excellent', and 70.3% said they would buy an IBM product again.

Acer had the best response to its customer support; 61.9% of Acer PC users described the company's support as either 'very good' or 'excellent'. More than 80% of respondents with Acer equipment rated its reliability highly ('very good' or 'excellent').

APC readers rate the brands

In order to rate the five most used PC brands in APC's PC Service & Reliability Survey 1999 (Acer, Compaq, Dell, Gateway and IBM), the answers to four specific questions (see below) were weighted and a percentage rating obtained. Basically, the higher the percentage, the better. These questions were:

1. If you have ever contacted the manufacturer's customer support service, how would you describe the support you received?
2. Has the equipment ever been unusable?
3. How would you rate the equipment for overall reliability?
4. Would you buy equipment made by the same manufacturer again?

For questions 1 and 3, the percentages of 'very good' and 'excellent' responses were added. For question 2, the percentage of 'no' responses was taken, and for question 4, 'yes' answers were counted. The four percentages were then averaged to reach our final results.

| | |
|---------|-------|
| Dell | 78.3% |
| Acer | 71.4% |
| Gateway | 69% |
| IBM | 62.8% |
| Compaq | 58.3% |

Source: APC PC Service & Reliability Survey 1999

Here are the results for the five brands most used by respondents in individual categories:

| | |
|--|--------|
| ✓ Best customer support | Acer |
| ✓ Most reliable equipment | Dell |
| ✓ Brand most likely to be purchased again | Dell |
| ✗ Worst customer support | Compaq |

Shopping

Where do APC readers buy their machines and components? Most said that there is no one place they buy components, but service still makes a difference.

Why APC readers chose a particular retailer*

| | (%) |
|---------------------------------------|------|
| It had the best price | 30.8 |
| I had previously bought goods there | 17.9 |
| I saw an advertisement | 16.5 |
| It was recommended by someone | 14.2 |
| It was conveniently located | 6.8 |
| I wanted to buy from a major retailer | 6.1 |
| I searched on the Net | 2.3 |
| Other | 9.5 |
| Not stated | 6.3 |

*NB Readers could choose more than one answer.

A large proportion of respondents (65.7%) said they'd be happy buying from the same retailer again. Almost 30% said they would not be returning or that they weren't sure. Indicating the volatility of this business, 6.3% said their former retailer was no longer in business.

Would you buy from that retailer again?

| | (%) |
|-----------------------|------|
| Yes | 65.7 |
| Not sure | 15.4 |
| No | 12.6 |
| No longer in business | 6.3 |

Almost 70% of the respondents said their most recent IT purchase was made in the past six months, and 17.1% said they had no immediate plans to make such a purchase. A significant 61.4% said they intended to make an IT purchase within six months.

When do you intend to make your next PC or component purchase?

| | (%) |
|----------------------------------|------|
| Within the next few weeks | 24 |
| Within the next six months | 37.4 |
| Within the year | 21.5 |
| No plans to make such a purchase | 17.1 |

As for the processors powering the machines, survey respondents said Intel was the chip of choice, accounting for more than 75% of machines being used. AMD was the runner-up; 9.2% of respondents' machines incorporated its chips. Cyrix, which came in for a battering in written comments made by readers, accounted for 8.3% of the chips in respondents' machines.

Source: APC PC Service & Reliability Survey 1999

Small retailers were popular with readers seeking components and PCs. Using respondents' comments as a guide, there is no doubt that small shops can often provide better service and more competitively priced goods. However, a large proportion of readers said they like to shop at the bigger retailers.

Buying PCs direct from Dell and Gateway proved a popular option with many respondents, though retail outlets such as Harvey Norman and Myer Grace Bros also accounted for a chunk of sales. The most popular reasons for shopping at these retail giants? 'I wanted to buy from a major retailer', followed by 'It had the best price'.

So how did APC readers decide where to shop? Price was the main reason given for buying from a particular retailer; more than 30% said it was the most important consideration. However, based on respondents' written comments, price may not be the determining factor for their next purchase.

Repeat business also accounted for a significant number of sales. Nearly 18% bought from a retailer because they had bought goods there before. This indicates that some retailers are doing the right thing, as consumers return to them when they need other IT products.

Advertising wasn't too far behind repeat business; 16.5% said they chose a vendor because of an advertisement.

Although shops are keen to promote PC deals, potential customers should exercise caution here. A number of respondents said that advertisements for PC packages sounded attractive, especially when extra software was thrown in. But sometimes the software was found to be next to useless, and in many cases it was either freeware or shareware. Before being swayed by an advertisement listing several software packages bundled with a PC, have a close look to see whether it's anything you will actually use.

Often the owners of small shops go out of their way to help and provide good advice because repeat business and word of mouth are their lifeblood. More than 14% of respondents said the main reason they bought from a particular retailer was because it had been recommended by someone. However, according to APC readers, many business owners don't care about customer satisfaction. They are not concerned about faulty equipment, and they certainly don't want to discuss refunds.

Only a small number said they had chosen their retailer after searching the Net, but we expect this figure to increase significantly over the next few years.

Where APC readers buy IT products

While price certainly played the biggest role in determining where survey respondents decided to buy their PCs and related products, a number of readers told us other factors won them over:

"The staff knew what they were talking about."
John Collier
Coral Point, NSW

"The quality of components at Micro Arts in Melbourne."
Hal Douglas
Leith, Tas

"Digital Star Computers staff were the most helpful."
Kris Capewell
Ettalong, NSW

"An APC review of a Pioneer Computer."
Karter Yu
Taringa, Qld

"Best performance for the money."

James Grieve
Surry Hills, NSW

"Avon Computech is a local store that provides good service."

Grant Scollay
Northam, WA

"The boss at Advantek is knowledgeable, friendly and helpful."

Hon Kok Fai
Leabrook, WA

"Reliability and honesty of Cumneas Electrical."

Paul Flann
Oxenford, Qld

"The store had a good reputation."

Glenn Kirk
Blackburn, Vic

"I saw them at an IT exhibition."

Jim Hillhouse
Wangi, NSW

42%

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you will be doing
this New Year's Eve.**



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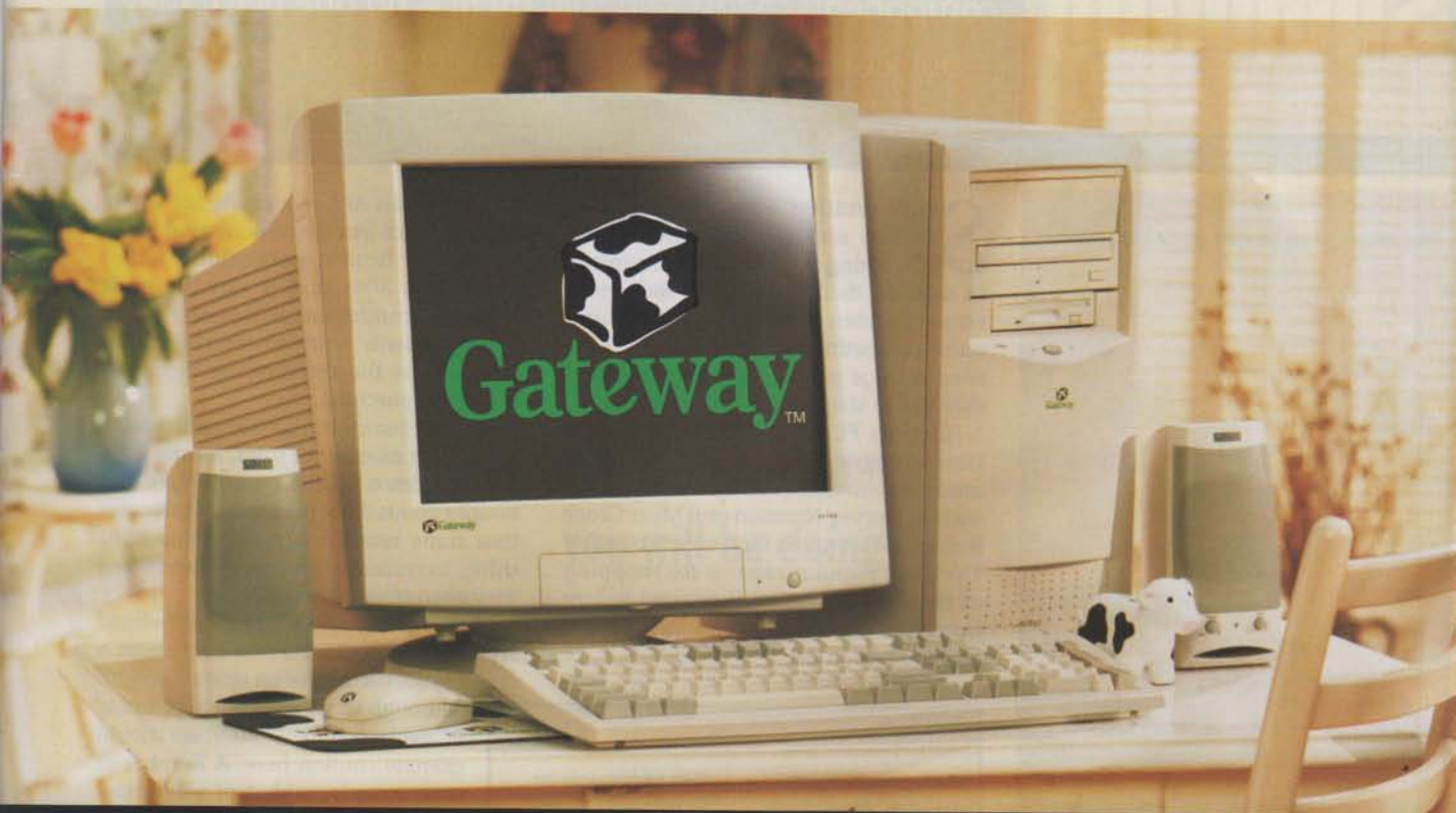
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- MS® Windows 98
- Corel WordPerfect Suite 8
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- Local Technical Support
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- Boston Acoustics Digital Media Theatre Speakers
- Mid Tower Case
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- Local Technical Support
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- Modular 8x Min/20x Max CD ROM Drive
- 16-bit Stereo, internal speakers, headphones
- 56k Data/Fax Modem
- 2 Type II or 1 Type III PCMCIA slots
- 9-cell Lithium Ion Battery & AC Adapter
- Casual Case
- MS® Windows 98
- Corel WordPerfect Suite 8
- 315 x 246 x 40mm - 2.9kg
- Gateway 3 Year Notebook Warranty*
- Local Technical Support
- Year 2000 Compliant**

\$3,999

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- 256KB Level 2 Cache
- 64MB SDRAM
- 2.5MB SDRAM Graphics Accelerator
- 6.4GB Ultra ATA Hard Drive
- External 1.44MB Floppy Drive
- Integrated 10x Min/24x Max CD ROM Drive
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- 56k Data/Fax Modem
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- 1 Type II PCMCIA slot
- 8-cell Lithium Ion Battery & AC Adapter
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58%

of you wish you knew
what your PC will be
doing New Year's Day 2000.

Gateway

Reliability

While this year's survey indicates that price plays a significant role in the choice of IT products, it appears the reliability of the product does not enter the equation until the goods fail and customer support is found to be virtually non-existent.

More than half of the respondents said they needed to contact customer support, which 37.2% described as excellent. Almost 15% described the service as poor.

Although a large percentage said their equipment had been unusable at some stage, survey respondents were generally impressed with the reliability of products.

Nearly half of all respondents (42%) felt the reliability of their equipment was very good, and 38.5% described the reliability as excellent. Some brand names had a less enthusiastic response in terms of reliability. Readers indicated they expected reliable products and excellent service as a result of buying a well-known brand.

It is inconvenient when equipment breaks down, especially in a business context. Downtime can drain business resources and affect workflow. Fortunately, many of the readers who responded to the survey are technically minded; 34% said they were able to repair the product themselves, 23.1% contacted the manufacturer, and 22% contacted the retailer. On the whole, respondents said they were satisfied with the repairs.

The big question, of course, is whether they would buy products made by the same manufacturer again. Manufacturers spend a small fortune promoting their products, which may get us in the first time, but do we go back? On the upside,

71.7% said they would go back to the same manufacturer. Only 13.2% said they would not buy from the manufacturer again, and 15.1% weren't sure.

In all, we are seeing customer service and product reliability levels slowly improving, but Australian businesses still have much work to do.

Next month's issue will include our annual ISP Service & Reliability Survey form. Be sure to tell us how your ISP stacks up, and be in the running for some great prizes. The results will be published in this year's APC November issue, along with our comprehensive ISP reviews.

APC readers tell all What is the worst product you have ever bought?

"NetComm Roadster Ultra SVD modem that doesn't work — I can't even give it away. I switched to a US Robotics modem and will never buy another NetComm product."

Jon Miller
Scarborough, WA

"Compaq Armada 4110 notebook. The keyboard died after three weeks and I had to pay for the repairs. Compaq said the warranty did not apply, even though I purchased it new."

James Ringof
South Tamworth, NSW

"Canon BJC 70 printer. It had continuous problems with black cartridges failing or not working properly. This was sometimes fixed by deleting and reinstalling drivers. It was more aggravation than it was worth."

Vic Bushing
Brisbane, Qld

"A 15in KTX monitor. It was expensive and had lots of intermittent problems. The retailers did not want to support it, even under warranty."

Matthew Coombe
Dingley, Vic

"A Teco notebook I had was repaired three times in 12

months — and there was always a huge wait for service."

Guy Coles
Leichhardt, NSW

"IBM Aptiva. It was totally unreliable and the warranty was not worth the paper it was written on. IBM was unhelpful and unconcerned by possible loss of reputation."

Julie Southwell
Huonville, Tas

"Hewlett-Packard Deskjet 690C printer. It broke down and was not repairable. This happened right after the warranty expired."

Michael Burke
Pearce, ACT

"A Cyrix processor. Its P rating isn't familiar to many people, and the price/performance ratio was bad. It's Intel or AMD and nothing else."

Ben Song
Duncraig, WA

"I had constant problems with my AcerNote 950 notebook over a two-year period. Problem areas included the touchpad, the battery, and the serial port — which were all replaced twice. The motherboard was also replaced. I will never buy any Acer products again."

Alex Danilov
Naremburn, NSW

"OS/2 IBM. Do you need me to explain?"

Phil Wright
Ultimo, NSW

"Linux. Compared to Windows 98, it sucked like a Hoover!"

Phillio Gillman
Seven Hills, NSW

"Western Digital Caviar 33100 hard drive that I had replaced twice already and is currently away being repaired. It is less than two months old."

Ben Manfield
Nightcliff, NT

"Pearl AMD-K6 300MHz notebook. It was unstable, and it was prone to crashing all the time."

Albert Chin
Werribee, Vic

"A PC from Empire systems because I had to replace more than 50% of components and they went out of business before the warranty expired."

David Vincent
Picton, NSW

"My Mitsumi scroll mouse experienced Windows 95 driver failure and tech support suggested a Windows 98 upgrade, which I did. An OS upgrade for a mouse!"

Isaac Wong
St Ives, NSW

Has the equipment ever been unusable?

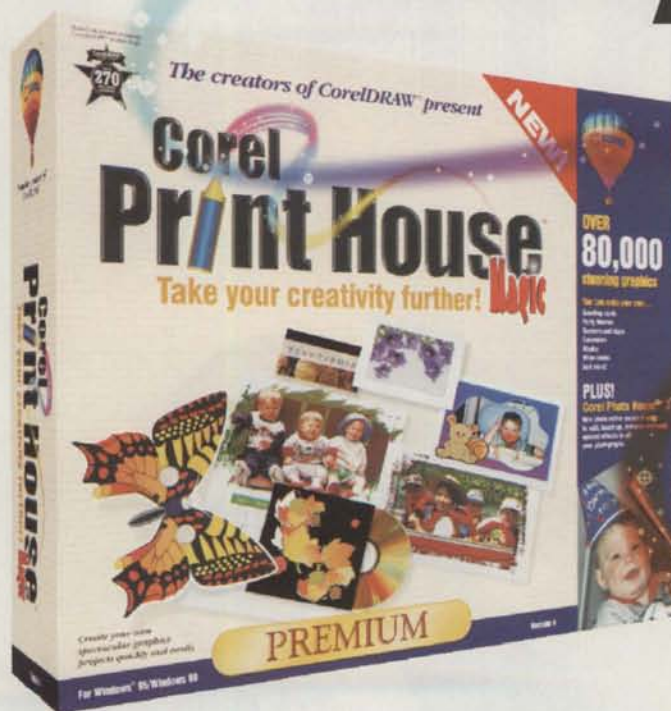
| | (%) |
|------------|------|
| Yes | 43.6 |
| No | 55.6 |
| Don't know | 0.8 |

Would you buy from that manufacturer again?

| | (%) |
|----------|------|
| Yes | 71.7 |
| No | 13.2 |
| Not sure | 15.1 |

Source: APC PC Service & Reliability Survey 1999

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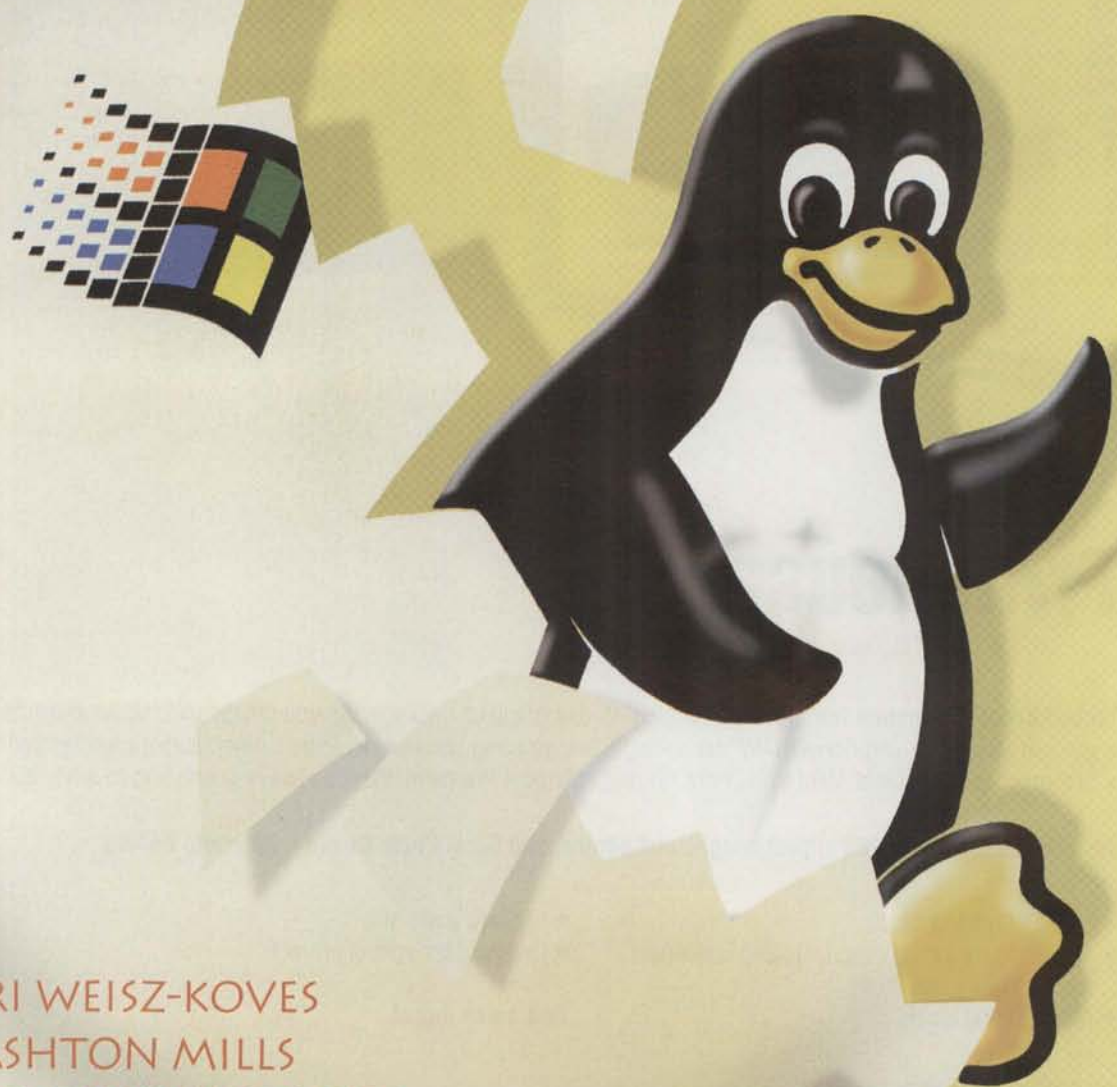


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Is Windows CRACKING?



REVIEWERS

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LINUX ASHTON MILLS

MAC OS STEPHEN WITHERS

WINDOWS 98 and 2000 NATHAN TAYLOR

OTHER OS CHOICES NATHAN TAYLOR

Buoyed by enviable developer support, Windows in its various flavours has long been the dominant operating system for most desktop PCs. But is it really the best choice for you? A number of new contenders, along with an old enemy, are vying for Microsoft's desktop crown, but questions remain. Is Linux really too hard to use? Is Mac OS dead outside publishing? Does anybody care about BeOS? And is it worth waiting for Windows 2000?

APC looks beyond the myths, rates the major desktop OS contenders and looks at which one suits your needs.

Can't live with them, can't live without them. That's the way many people feel about the operating system they are using. But there are choices.

February 15, 1999 marked the now infamous Refund Day, when people who did not want to pay the 'Microsoft tax' were urged to request refunds from Microsoft if they didn't use the Windows operating system that came pre-installed on their system.

The problem is just about every PC you buy at present is loaded with a version of Windows: Windows 95, 98 or NT. The first thing some people do after buying a new computer is uninstall the operating system and install their OS of choice, yet they still pay for Windows because of the deals OEMs have with Microsoft.

Successful or not, Refund Day spotlighted a fact that has for some time escaped the world of PC ownership: there are desktop OSes other than Windows (and Mac OS for Mac users). Mac users willing to partition their system can install a version of Linux, a version of BeOS, and possibly throw in a BSD Unix or two for good measure. PC users have even more options. You can have partitions with Windows 95, Windows 98, BeOS, Linux — and, if you're feeling particularly whacky — DOS and Windows 3.1, or even FreeBSD.

In spite of the recent success of non-Microsoft OSes, particularly Linux on the Intel platform and Mac OS on the iMac, the vast majority of desktop OS installations are Microsoft products. Figures vary, but it is generally agreed that Microsoft holds at least 80% of the desktop market — probably closer to 90%. Most of this is Windows 95 and 98,

although Windows 3.1 and Windows NT also run on a large number of desktops.

In the past few years some new challengers have emerged. Always a stable, high-performance server platform, Linux has just begun to be a useful desktop OS. Recent developments have taken it to the point where you don't have to be a Unix guru to use it. The latest distributions from Caldera and Red Hat (see *APC's* reviews on page 34) for instance, make Linux far easier to use — although it is not yet quite as simple to use as Windows.

From the other end comes Mac OS. Technically not as sound as Windows, Mac OS has always been renowned for its user-friendliness. For a while it appeared Mac OS was doomed to be a historical footnote, but the recent successes of the iMac and G3 Macintoshes have brought it back into the spotlight.

Then there's another upstart OS, BeOS. The Be operating system was originally designed to run on PowerPC devices, but has since been ported to the Intel platform as a result of the cancellation of Apple's clone program. It offers multimedia capabilities like we've never seen on either platform, and will prove an able competitor in this space. BeOS incorporates some technology that others would do well to emulate.

Of course, all three of these products could easily be crushed when Microsoft releases the much-anticipated Windows 2000 Professional. Windows 2000 is supposed to offer the feature set and compatibility of Windows 98 with the stability, security and performance of Windows NT. It's not out yet, but is likely to reassert Microsoft's dominance on the desktop.

We've taken these four OSes and

provided a broad overview of each, along with a review of an operating system you're probably already familiar with: Windows 98, which remains the one to beat in volume terms.

Each operating system was given a score out of five in six different areas: usability, hardware support, out of the box features, application support, technical support and performance. The ratings, in this instance, are not absolute but relative. For example, a score of five in usability doesn't mean the OS is flawless, but does represent the benchmark for which all others should strive.

Usability refers to the ease with which the OS can be operated. It takes into account OS configuration, user interface, help systems and installation.

Hardware support rates the diversity of hardware supported by the operating system. Does it support multiple processors, large numbers of peripherals, multiprocessing and new interfaces like USB?

Out of the box features rates the number and quality of the applications and utilities bundled with the OS. What can you do with just an operating system?

Application support rates the number, variety and quality of applications available for the platform. It also takes into account the ease with which applications can be developed for the platform.

Technical support scores are based on the availability and cost of technical support for the platform.

Performance and stability ratings reveal how well the platform utilises the hardware on which it runs, and how often you have to reboot when unruly programs bring the system down.

MICROSOFT WINDOWS 98

Windows' status as the world's most-used operating system is, for the moment, undisputed. Most readers are probably familiar with the Windows 95 and 98 operating systems, which are close to identical. The critical mass achieved by Windows has a lot of advantages for its users, even though it is not the most technically sound OS available.

USABILITY

Windows 98 has come a long way from its beginnings in DOS, and is now a lot easier to use — very much in the style of Mac OS. The need for legacy support, however, has given it a number of annoying quirks, such as inconsistent support for file names. The file system can be difficult to comprehend, and when things go wrong it can get messy. In the end, it's still running DOS under it all, which introduces all sorts of complexities.

On the upside, Microsoft has done a great job of hiding Windows 98's complexities behind an array of wizards and user-friendly graphical tools.

The installation process is smooth, if a bit long, and the help system is quite advanced, although it never seems to have the answer you are seeking. You'll never need to use a command prompt or manually edit a configuration file, although experienced users often find this can be faster than using Microsoft's tools.

Rating: 

HARDWARE SUPPORT

Given their status as the world's most-used OSes, Windows 95 and 98 — for which most drivers are interchangeable — have near ubiquitous hardware support. Most consumer hardware is covered with Windows 98 drivers, and Windows compatibility is a common requirement for commercial success in consumer computer hardware.

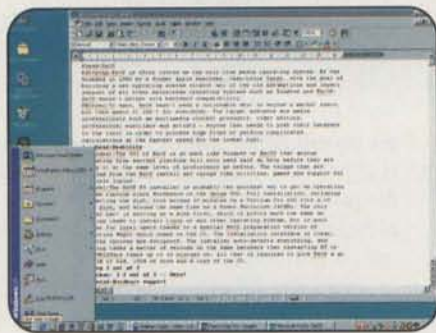
Windows 98 comes with a huge driver database, and Microsoft has also been very pro-active in its support of new types of hardware. It was the first to support ACPI, DVD and USB — tasks that Windows does very well.

Rating: 

OUT OF THE BOX FEATURES

With each new release of Windows,

Microsoft packs in more applications that formerly had to be purchased separately. The system includes several basic text editors; Internet tools, including a Web browser and mail client; simple utilities for system monitoring and networking; tools for creating and editing Web pages; and several limited server products for publishing Web pages and sharing Internet connections. Some multimedia tools are also included.



The inbuilt features of the OS are only basic, so most users will probably have to buy full versions of certain applications. Most people opt for suites such as Microsoft Office or Works.

Rating: 

APPLICATION SUPPORT

As with Windows' extensive hardware support, the OS really benefits from critical mass when it comes to software. Most commercial desktop applications and games are either developed for or ported to the OS.

Consequently, the range of software available for the platform is huge. Windows 98 is a must for gamers.

Microsoft reluctantly supports open standards, but prefers developers to use proprietary Microsoft application programming interfaces (APIs).

For instance, Microsoft's DirectX APIs, designed for communication with multimedia hardware, is not licensed for any other platform. Still, the development tools for the platform are first class, and

STRENGTHS

- ★ Best application support
- ★ Wide compatibility
- ★ Excellent support for hardware
- ★ Easy interface

WEAKNESSES

- ✧ Unstable and lacklustre performance
- ✧ Expensive technical support
- ✧ Difficult to customise

Microsoft does a very good job of supporting its developer base.

Rating: 

TECHNICAL SUPPORT

Microsoft offers extensive technical support for the product — at a price. A technical support call will cost you at least \$35. Windows is so widely used there will probably be somebody about to help you with problems. If not, Microsoft has a large network of authorised support providers.

Rating: 

PERFORMANCE AND STABILITY

Technically, the specifications of Windows 98 are good. Unlike Mac OS, it supports memory protection and pre-emptive multitasking (in which the OS partitions application time shares, rather than the applications themselves).

However, Windows 98's performance and stability is well below par, and poorly written applications can still bring it to its knees. The problem lies largely in large chunks of 16-bit 'legacy code'. This is especially nasty on Pentium Pro II and III systems, which are optimised for 32-bit code. Operating systems like BeOS and Linux put Windows to shame.

Rating: 

CONCLUSION

While not the best operating system from a technical standpoint, Windows is the last word in compatibility — simply because everybody else uses it. It's well suited for all applications except high-volume server functions. A safe choice.

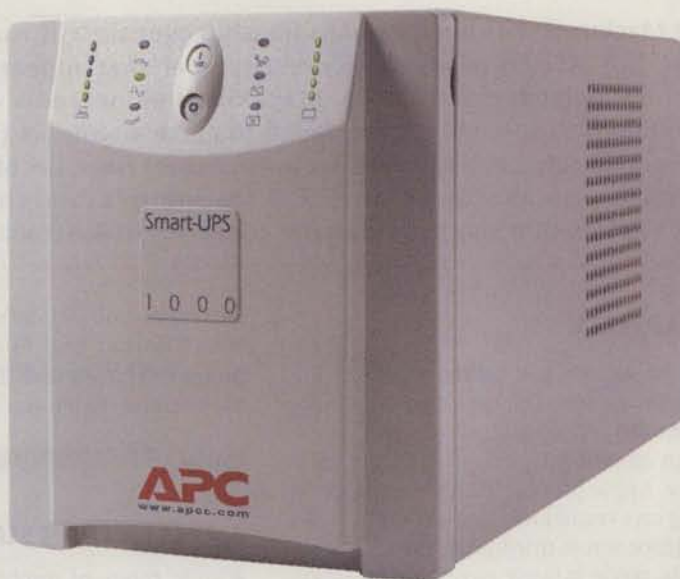
| | |
|---------------|---|
| ■ Distributor | Microsoft |
| ■ Phone | 132 058 |
| ■ Price | \$319 full packaged product, \$169 upgrade (\$13.95 to upgrade to Second Edition from Windows 98) |

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MAC OS 8.6

The Macintosh has been Apple's flagship ever since it was launched in 1984, but Mac OS is a relatively recent label, first appearing when Mac OS 7.6 superseded System 7.5. Mac OS has pioneered a wide variety of technologies, and while some failed to make an impact (such as the PowerTalk collaboration architecture), others have become industry standards (notably QuickTime). The Macintosh's (and consequently Mac OS's) market share is currently about 9% in Australia.

STRENGTHS

- ★ Excellent usability
- ★ Easy installation
- ★ Easy networking

WEAKNESSES

- ☆ Software availability
- ☆ Limited to Apple systems
- ☆ Doesn't fully exploit the power of the hardware

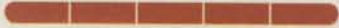
USABILITY

One of Apple's key selling points is the usability of Mac OS, and to a very large extent this is justified.

An important part of this is consistency; Apple pioneered the idea of specifying an overall look and feel for the user interface across third-party applications. It also made it fairly easy for developers to follow these rules, and users responded by strongly supporting programs that complied.

Mac OS is easy to install. The software comes on a bootable CD-ROM, and the latest Installer program makes it simple to update an existing System Folder, perform a clean installation, or just add a single component.

Rating



HARDWARE SUPPORT

Since Apple abandoned its clone licensing system, it has retained strict control over the integration of hardware and software, and has been able to push hardware features such as CD-ROM drives and Ethernet interfaces ahead of their general adoption. Intel-based PCs were the first to feature USB ports, but since the iMac's launch USB peripherals have become more widely available.

Today's Macs are firmly standards-based when it comes to peripherals: it's USB and FireWire/1394 for external devices, IDE for internal drives, and PC Card and Card-Bus for notebook expansion.

Rating



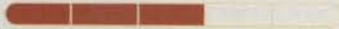
OUT OF THE BOX FEATURES

A few applications are included with Mac OS. For Internet access, there's the choice of Microsoft Internet Explorer with Outlook Express, or Netscape Navigator.

Other utilities include SimpleText (a basic text editor), a calculator and a 3D graphing calculator, plus Aladdin's StuffIt

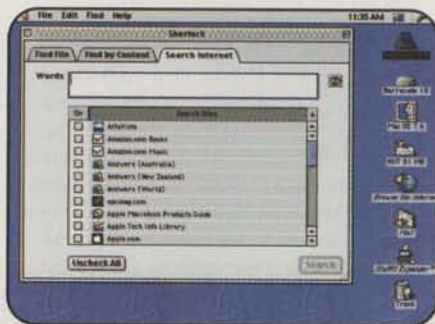
Expander and Adobe's Acrobat Reader. Web Sharing and File Sharing (work-group-level Web and file serving) reduce the need for additional software.

Rating



APPLICATION SUPPORT

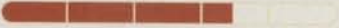
A wide range of applications are available for Mac OS, although choices in



many categories are more limited than those for Windows.

However, developer interest in Mac OS has increased following Apple's iMac-led resurgence, especially from games developers. The Mac's rich set of APIs has been simplified for game developers through Game Sprockets, a collection of services for graphics, sound, input devices and network communications. OpenGL is also available for Mac OS.

Rating



TECHNICAL SUPPORT

The Apple Support Line offers three levels of support, catering for small users with one or two Macs (\$149 per year per computer); businesses with up to 10 computers (\$649 per year for 24 'issues'); and the open-ended Apple Support Pro (priced according to the number of computers and the breadth of service required). In addition to Apple, there are a number of small businesses that offer specialised local Macintosh support.

Online, Apple's Technical Information Library (<http://til.apple.com.au/>) has an extensive range of information that can be extremely useful for problem solving. Sites such as MacFixIt (<http://www.macfixit.com/>) are also useful resources.

Rating



PERFORMANCE AND STABILITY

It's too early to comment extensively on the stability of Mac OS 8.6, as it was released just days before this article was written. However, 8.5 is generally regarded as being one of the more stable versions of Mac OS, and Apple claims 8.6 is even better in this regard.

However, most applications on the platform are written with 'cooperative multitasking,' which relies on programs to be well behaved and not hog the CPU. Mac OS 8.6 does allow applications to perform pre-emptive multitasking, but it is not widely exploited.

The Mac also lacks multiprocessor support and protected memory, which means badly written programs can overwrite each other's memory.

Rating



CONCLUSION

Mac OS is well suited for general desktop use. It is still very popular in the publishing and design markets, where it has been dominant for more than a decade, and many small-business, home and education users have benefited from its trouble-free operation.

It also retains a solid base of application support, but those whose main desire is an operating system that offers maximum power and hardware exploitation should look elsewhere.

| | |
|---------------|---------------------------------|
| ■ Distributor | Apple |
| ■ Phone | 1300 300 755 |
| ■ Price | \$165, upgrade from 8.5 is \$33 |

LINUX

From humble beginnings Linux has become a looming competitor to the Windows world. Initially developed in 1991 by Linus Torvalds following the open source model, the Unix-based variant is claimed to provide better performance and reliability than its competitors. Plus it's free. Linux is sold in 'distributions', which bundle the core Linux components with an installer, applications and utilities. Some of the best-known distributions include Red Hat, Caldera, SuSE and Debian.

USABILITY

It's been said that Linux is hard to use because of its Unix history, but this is changing. Recent distributions such as Red Hat 6.0 and Caldera 2.2 not only provide a standardised, well-designed UI but their interfaces are often packed with features you won't find under Windows. Installation is also a snap. It used to be the Linux Achilles heel, but it is rapidly disappearing. However, new users still need to climb a moderate learning curve in order to make the most of Linux.

Rating 

HARDWARE SUPPORT

Linux supports a vast array of hardware, from traditional devices such as drives and graphics cards through to obscure technologies such as amateur radio and ancient tape devices. The only hitch with Linux hardware is that when new products hit the market, there is not always a Linux driver available, and it may take months before avid programmers code a driver to support them. Common or big-name brand products are a safe bet, as support for such hardware is quickly added to the Linux kernel. Linux now supports symmetric processing (SMP) and currently runs on Intel, Mac, SPARC and Alpha platforms.

Rating 

OUT OF THE BOX FEATURES

A default installation of Linux contains Web, file, email, news and print servers as well as inbuilt Windows and Unix networking support. Most distributions also come with office suites, graphical manipulation software, multimedia software, and network configuration and administration software.

Linux can be used as a high-end server or simple workstation; just about everything you'll ever need is supplied. Given

the price point for these features, it's easy to see why Linux is rapidly gaining in popularity.

Rating 

APPLICATION SUPPORT

Along with usability, this is the other common drawback with Linux. If you



plan to run a server of some sort, you'll have no problem with applications. End-user applications are a different story. While office suites such as StarOffice (which can use Microsoft Office formats) are now available, and there are hundreds of Windows-equivalent applications available, there is still a void waiting to be filled in the end-user Linux application market. Within the last 12 months companies such as IBM, Oracle, Netscape, Corel and Lotus have announced support for Linux, so application support will improve in the future.

Rating 

TECHNICAL SUPPORT

Linux has by far the widest technical support network in the world — consisting mostly of other Linux users who are always keen to help. The average Linux install also includes a large database of HOWTO files which provides solutions to common problems. However, organisations that use Linux in a commercial

STRENGTHS

- ★ Reliable and efficient
- ★ Plenty of bundled applications
- ★ Free

WEAKNESSES

- ☆ Moderately steep learning curve
- ☆ Few end-user applications

capacity and need at-call support staff have limited choices. However, commercial support options are currently growing as Compaq, Dell, Hewlett-Packard and IBM have recently announced Linux support services.

Rating 

PERFORMANCE AND STABILITY

Unix is renowned for its stability and performance, and Linux is said to be no different. It's possible for applications to crash on Linux, but Linux itself rarely goes down and it's not uncommon for Linux boxes to be up for many months at a time. The most common reason for downtime is hardware and software upgrades.

Rating 

CONCLUSION

Linux is a highly flexible operating system, capable of being tailored to suit everything from a high-end server down to small embedded systems running from a single floppy. Due to its heritage and open source development model, it has become a popular, reliable, flexible and stable operating system which is slowly earning respect the world over.

What it boasts in power and performance, however, it lacks in end-user applications and ease of use. Linux is best suited to technical users and just about any server task, and considering that it's free, it's easy to see why more and more people are trying out this alternative operating system.

| | |
|---------------|--|
| ■ Distributor | Numerous (depends on distribution). See http://www.linux.org for details. |
| ■ Phone | N/A |
| ■ Price | Varies by distribution. Free for download. |



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BEOS 4.0

BeOS is often touted as the only true media operating system. Be was founded in 1990 by former Apple employee Jean-Louis Gassée who wanted to create an OS that did not have the old assumptions and legacy support of other mainstream OSes. BeOS hasn't made a noticeable dent in anyone's market share, and it isn't for everybody. Its target audience is media professionals — people who need to push their hardware to the limit.

STRENGTHS

- ★ Fast and stable
- ★ Quick load times
- ★ Compatible with many Unix applications

WEAKNESSES

- ✧ Poor hardware support
- ✧ Little technical support
- ✧ Few commercial applications

USABILITY

The GUI of BeOS is so much like Windows or Mac OS that for anyone migrating from another platform it will only take half an hour before they are using it at the same level of proficiency.

The BeOS Release (R4) installer is probably the quickest way to get an OS running since Workbench on the Amiga 500. Full installation, including formatting the disk, took 10 minutes on a Pentium Pro 200 with a 2G SCSI disk, and about the same time on a Power Macintosh 240MHz. The only tricky part is setting up a disk first, which is pretty much the same as getting ready to install Linux or any other OS, but is much easier for Intel users, thanks to a special BeOS preparation version of Partition Magic, which comes on the BeOS CD.

The installation interface is clean, and the choices are foolproof. The installer auto-detects just about everything, and booting takes a matter of seconds rather than minutes. All you need to try out BeOS is 16M of RAM, 150M of hard disk space and a copy of the CD.

Rating 

HARDWARE SUPPORT

BeOS runs on both PowerPC (Macintosh) hardware and Intel (x86) hardware. Being an early release of a new operating system, BeOS does have a fairly limited hardware compatibility list, especially for soundcards and new technologies. It won't run on some hardware, but standard components such as IDE drives, Pentium processors and Matrox video cards are fine. BeOS R4 finally brings support for Adaptec SCSI cards, and a wider range of video cards, but it will never support as many variations of hardware as Windows (or even Linux) can. However, it is the kind of OS that professionals would buy hardware it runs on, not the other way round.

Rating 

OUT OF THE BOX FEATURES

The basic BeOS system is just a framework for applications to use hardware to its full advantage. There are many small applications installed, which provide very basic HTTP serving, text and disk editors, integrated email, CD player, file utilities, system-wide contact information, image viewers, file converters and a couple of hundred GNU tools. Missing from the BeOS install are features such



as utilities, games and support for multiple logins. However, the Unix style of the OS means that adding a function to the whole system only requires you to drop a tiny file into the /beos/bin directory. BeOS has native OpenGL, bundled BeOS API tools (including Metrowerks CodeWarrior), audio tools and everything needed to set up a TCP/IP stack.

Rating 

APPLICATION SUPPORT

BeOS lacks significant developer support. There are hundreds of freeware applications available online at <http://www.be.com/beware>, and a handful of commercial applications such as Gobe Productive (a basic office suite). But there are no big applications to draw users over, such as Microsoft Office or Adobe Photoshop. The commercial applications that have made the move to BeOS are definitely niche markets — analog audio hardware emulators, DJ-specific recording

software, very-high-end 3D animation and modelling. German professional audio specialist EMagic has made its hardware and software BeOS compatible, Cycore Computers has announced the Cult3D real-time 3D rendering engine, and Strata is moving the digital video staple VideoShop and the professional 3D modelling and animation package StudioPro to BeOS, as well as Mediapede UltraDV and rö Design Showboat.

Rating 

TECHNICAL SUPPORT

BeOS is a refreshing choice of OS for anyone who wants to play around with something different. Unfortunately, using BeOS is a lonely world with few people to call on, except for the very helpful BeOS evangelists out there. The Be Web site at <http://www.be.com/> is a useful starting point for FAQs and other documentation.

Rating 

PERFORMANCE AND STABILITY

BeOS is the perfect OS for the performance conscious — it is lean, fast and incredibly stable due to full symmetric multiprocessing and protected memory. APC Labs has found it easier to crash Sun Solaris than BeOS.

Rating 

CONCLUSION

BeOS is perfect for those who want raw power for their specialist applications. The protected memory and symmetric multiprocessing means stability and speed that only dedicated Unix hardware/software workstations can beat. However, don't expect much in the way of software.

- Distributor Custom Technology
- Phone (02) 9686 4055
- Price \$139

MICROSOFT WINDOWS 2000

The heir apparent to Windows 98 (after the final iteration of Windows 9x which is in the works), Windows 2000 has yet to reach release. It is currently a feature-complete but buggy beta. Microsoft has not pinned down a release date, but it is expected to be late 1999 or early 2000. The desktop version, Windows 2000 Professional, takes the Windows NT kernel and adds many Windows 98 features. The beta status of Windows 2000 makes evaluation difficult. We reviewed Beta 3 of the OS, but the end product may be very different if it ever makes it onto the shelves.

USABILITY

Sporting an interface almost identical to that of Windows 98, migrating to Windows 2000 should be a breeze. The wizards and help are even more extensive than Windows 98's, and there are some innovative features, such as menus that 'learn' your usage patterns and adapt themselves. Installation time is relatively long, and the help system is decent but does not provide answers to advanced queries.

If you're already using Windows 95, 98 or Windows NT 4.0, you should have no trouble using Windows 2000. However, computer novices face a steeper learning curve than with a product like Mac OS.

Rating

HARDWARE SUPPORT

As a prerelease product, it is hardly surprising that Windows 2000 lacks the range of hardware support Windows 98 offers, although it is still leagues ahead of other OSes. Also, a large number of devices have drivers that can be ported from Windows NT 4.0, which supports a lot of hardware. When Windows 2000 is released, we expect that all major devices will quickly have drivers available for the OS.

While Windows NT 4.0 does not support Plug and Play, ACPI, DVD, AGP or USB, these are all supported features of Windows 2000 Professional. Support for other emerging hardware specifications, such as FireWire and Device Bay, are also expected on the product's release.

Rating

OUT OF THE BOX FEATURES

Windows 2000 has all the mod cons, although like Windows 98, it lacks sophisticated bundled applications — with the arguable exception of Internet Explorer 5. 'Lite' versions of a number of other Microsoft applications are also included,

along with simple utilities such as text editors, an indexing tool, multimedia viewers, system utilities and user managers.

Windows 2000 is designed to be a corporate OS, so it includes a number of security features, including a secure file system and user management features. It works best in conjunction with the set of Windows 2000 servers (different products from Microsoft), but should fit well into any organisation.

Rating



APPLICATION SUPPORT

The application support base for this product is second only to Windows 98, and it should be able to natively run many Windows 98 applications. It should technically be able to run any Win32 app, although this was not the case in this beta. The inclusion of the DirectX media APIs in the product should also enable it to natively run many games, although its success at doing this in the beta was limited. The OS can also run older DOS applications in what amounts to a virtual machine.

Rating

TECHNICAL SUPPORT

Microsoft's unfriendly 'charge per call' support model will apply to Windows 2000 when it is released. As with Windows 98, of course, there will be a large base of users who will be able to help you out, and

STRENGTHS

- ★ Can run the majority of current Win32 applications
- ★ Supports recent hardware advancements
- ★ Fully 32-bit and more stable than previous versions of Windows

WEAKNESSES

- ☆ Still in beta
- ☆ Not stable enough yet for release
- ☆ Costly technical support

a number of authorised support vendors will be available throughout Australia.

Rating

PERFORMANCE AND STABILITY

The beta status of the product prevents us from properly evaluating its performance and stability, although it is not looking good right now. As a result of the massive amounts of code in the product, analysts have already said Microsoft has its work cut out for it if the product is to be perfectly stable when released.

If Windows NT 4.0, the product on which Windows 2000 is based, is any indication, then Windows 2000 should be much more stable than Windows 98. It runs a lot of services in the background, but its overall performance is not much better than Windows 98. However, on the 32-bit optimised platforms of the Pentium II and III (and Pro) there should be a considerable performance boost. It also features better memory protection than other versions of Windows.

Rating: N/A (still in beta)

CONCLUSION

The problems suffered by Microsoft in its development of the server versions of Windows 2000 will delay the product considerably, although there have been rumours that Microsoft might release Windows 2000 Professional before the other versions. If it does, it's almost certain that a large number of users will migrate, although analysts are saying that businesses should wait for at least one service pack before deploying the product. Home users will benefit from the product — especially those absolutely fed up with constant system crashes.

| | |
|---------------|-----------|
| ■ Distributor | Microsoft |
| ■ Phone | 132 058 |
| ■ Price | TBA |

OTHER OS CHOICES

Want to look beyond the five OSes we've reviewed here? There are plenty of other operating systems to try — some old, some new. If you're feeling curious, unsatisfied or nostalgic, here are some other options.

UNIX AND FRIENDS

Sun Solaris A powerful and stable version of Unix, Solaris has a lot to offer the desktop user, in spite of its designation as a workstation and server OS. It is well packaged and its default X Window System interface doesn't require a great deal of computer knowledge to use. It is Unix, and suffers a little in the usability department for it, but you shouldn't have to manually edit too many configuration files to get it working. It runs on both Sun's SPARC platform and on Intel systems. Best of all, it's free for non-commercial use.

FreeBSD Another popular free Unix variant, FreeBSD has lived in the shadow of Linux recently, although it is no less capable. Its primary use is as an ultra-stable server (particularly Internet server) platform, although it can use the X

Window System to provide a decent GUI. It's not for the faint-hearted, though, and you can expect to be fiddling a lot to get it to work the way you want. It currently runs on Intel and Alpha systems, with light system requirements. Take a look at <http://www.freebsd.org/> for more information. For those interested in experimentation, there are other BSD variants as well, all based on a kernel originally developed at the University of California. NetBSD (<http://www.netbsd.org/>) and OpenBSD (<http://www.openbsd.org/>) are available on just about every conceivable platform, and provide similarly stable server-oriented platforms primarily for server, firewall and research purposes, but they can also run GUIs and be used as desktop OSes.

AIX, OS/400, HP-UX, Tru64, Ultrix, SCO UnixWare, Irix and other commercial Unix variants

There are a lot of options here, although most are designed around a specific hardware platform. Several variants have PC versions. They generally follow the same basic structure and almost all of them have some kind of X Window System support, if you feel you need a GUI to be productive. They are mostly designed for workstation and server tasks, and are rarely used for desktop purposes. But be warned: just because you know one Unix variant, it doesn't mean you know them all — and none of them are terribly easy to use.

DOS AND BEYOND

DOS A relic of days gone by, this single-tasking operating system takes a minimalist approach to OS design. Only the very core services are provided in the kernel — the rest are supplied through the use of small applications that stick in memory. There is no GUI, although certain applications, such as older versions of WordPerfect, provide one. There are varieties of DOS available,

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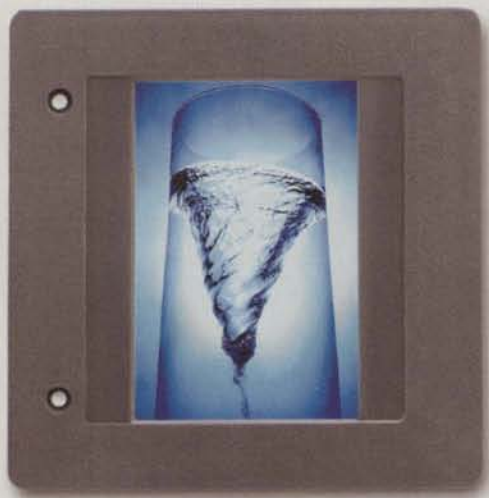
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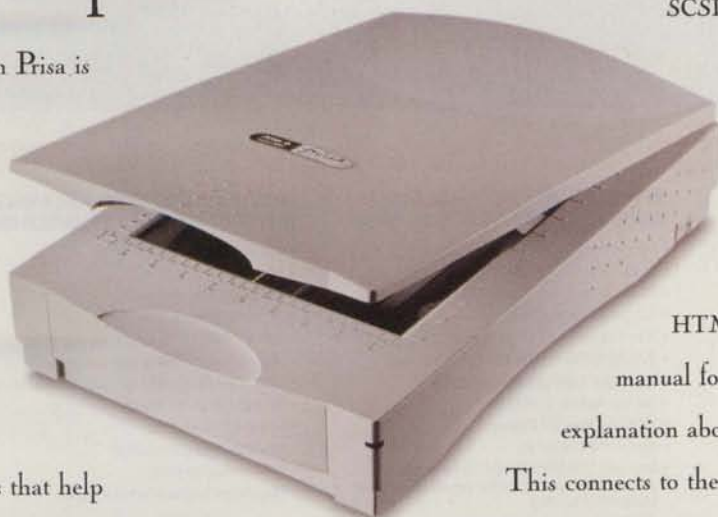
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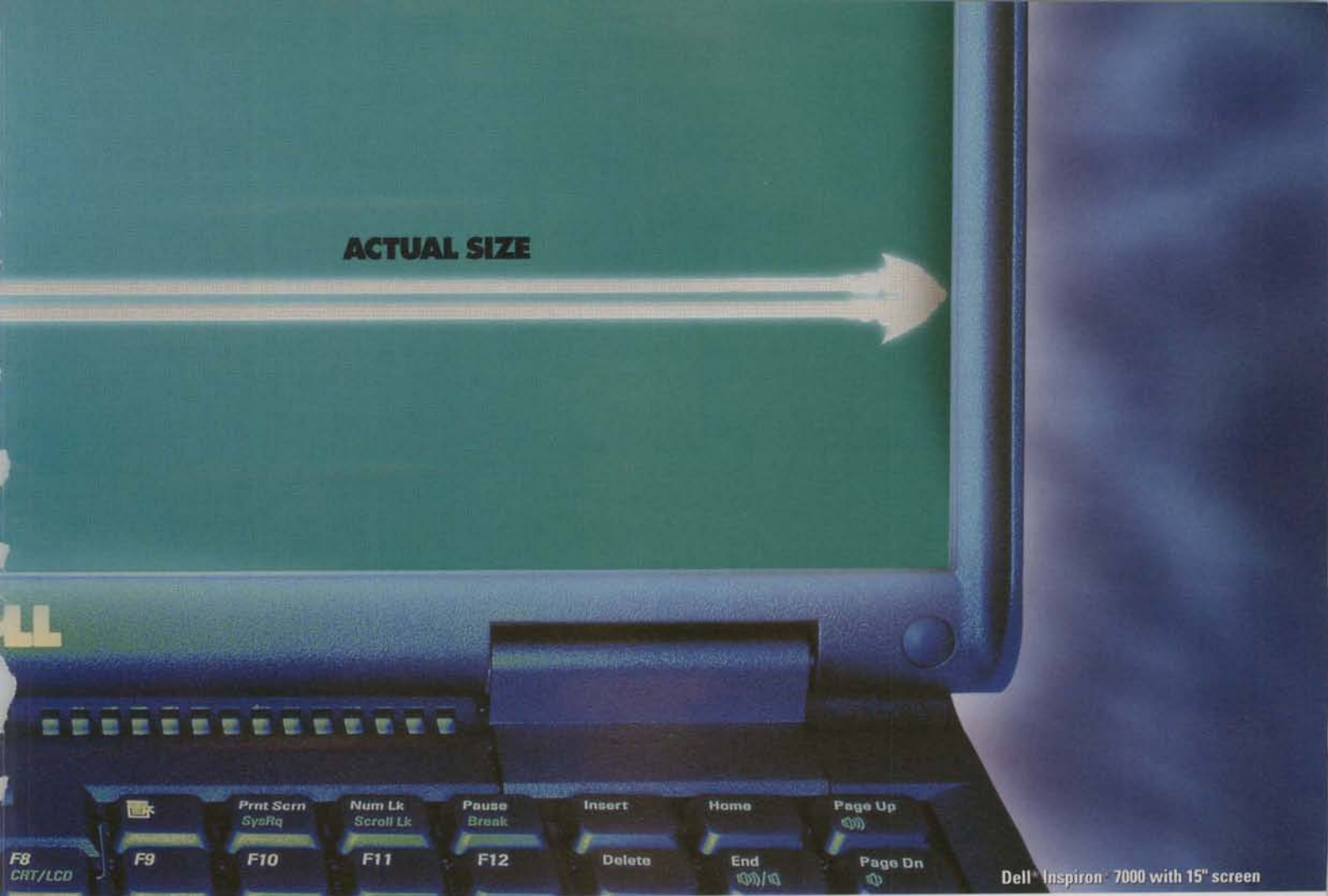
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Third time lucky

By SELINA MITCHELL

Will third-generation mobile phone technology provide a single global standard, national coverage and, at last, the realisation of global roaming? Probably not.

First there was analog and then along came digital. Now, second-generation wireless communication services are still being implemented and enhanced in Australia, and plans are well under way for the third generation, known as IMT-2000 or simply 3G. (IMT-2000 also covers satellite systems; this article focuses on the terrestrial wireless aspects.) While the exact details of the 3G standard are still unknown, one thing is clear: in the next generation of wireless systems we are likely to see a number of standards supported over multiple frequency bands, instead of a single technology base.

Many APC readers are probably aware of the mess of digital technologies involved in the second generation of wireless communications. Australia has one established technology infrastructure, Global System for Mobiles (GSM), provided by Optus, Telstra and Vodafone. Another, IS-95 (also known as code-division multiple access, or CDMA) is in the process of being implemented. In other parts of the world, Digital Advanced Mobile Phone Service (D-AMPS; another time division multiple access technology like GSM), personal communications services (PCS) and Personal Digital Cellular (PDC) are also used, along with other technologies. In some countries, there are four or five technologies to choose from, which makes national coverage and use difficult. Global coverage with one handset remains impossible.

For this reason, industry analysts have said, one of the aims of 3G was to have a clean-up. The idea of a single standard appeals to carriers and to the International Telecommunications Union (ITU), which is responsible for determining telecommuni-

cations standards. A single standard would create some certainty in the market about the 'next step', which will involve a great deal of infrastructure expenditure.

Over the past few years, discussion regarding 3G has been heated and complex. The makers of today's second-generation systems have already laid down migration paths toward the third generation, and they want these included in any future internationally adopted plans. (This would make it easier to sell their second-generation standards and continue to profit in the future.) The problem, however, is that competing second-generation suppliers have not necessarily wanted to ensure interoperability or allow their competitors to use what they regard as their technical property.

Heavyweight backing

The companies behind GSM, D-AMPS and PDC (led by Ericsson) and the European Telecommunications Standards Institute, all supported one air interface standard, wideband CDMA (W-CDMA). Those companies using IS-95 preferred another option, cdma2000. Qualcomm, the developer of the IS-95 technology, was staunchly on the side of cdma2000. Both air interface standards are based on the same code-division multiple access technology, but they work on different frequencies — W-CDMA on about 2GHz and cdma2000 on 1,900MHz and 800MHz. Of the 16 proposals for a 3G air interface standard put to the ITU, two (one each from the Ericsson and Qualcomm

camp) were affected by intellectual property rights (IPRs) that were before the courts. The ITU could not consider all the options while litigation continued.

A lot of the fracas surrounding wireless communications is linked to the frequencies that need to be used for particular technologies. First-generation refers to analog systems and second-generation to digital technologies such as GSM, PDC, D-AMPS and IS-95. Although digital technologies were primarily designed for voice communication, they will be enhanced to include data capabilities. Currently they cover the 800MHz, 900MHz and 1,800MHz frequencies in Australia. 3G refers to systems designed for the convergence of voice and data, including multimedia and the Internet (see 'What is 3G anyway?', page 110). The ITU has reserved frequency spectrums for these



systems under its IMT-2000 banner, and has set aside 1,885 to 2,025MHz and 2,110 to 2,200MHz (these are commonly referred to as 2GHz).

There are a few exceptions that have hampered next-generation planning. The decision by the World Radio-communications Conference (WRC) to use the 2GHz frequency for the third generation has been followed by most countries, except the US. It has used some of that set-aside spectrum to supply second-generation services, hence GSM at 1,900MHz in the US. To add to the confusion, Qualcomm's 3G solution uses the same IS-95 800MHz spectrum.

The W-CDMA camp changed its air interface to fit the required frequency, but Qualcomm said that the solution was based on CDMA IPRs it owned through its development of IS-95. Ericsson did not agree and was not interested in incorporating IS-95 into its 3G solution anyway.

Convoluted discussions took place in the months leading up to March this year, when the IPRs dispute was settled. Ericsson and Qualcomm agreed to resolve all of their global disputes relating to CDMA technology. They agreed to jointly support one CDMA standard for 3G with three optional modes (IS-95, W-CDMA and cdma2000), to cross-license patent portfolios, and to end all litigation. Subject to regulatory approval, Ericsson will purchase Qualcomm's terrestrial CDMA wireless infrastructure business.

Both companies will seek approval for a combined third-generation standard from the ITU and other standards bodies. This standard will encompass three modes

of operation: direct-sequence frequency division duplex (FDD), multicarrier FDD, and time division duplex (TDD). Each mode supports operation with both GSM MAP and ANSI-41 networks.

In essence, this means the 'war' between these two camps is over and the ITU can get on with establishing the 3G standard, which will encompass at least two technologies on two frequencies. At least that is the theory.

The solution

Although the ultimate solution — a single standard — will not be the result, analysts say 3G will probably be less of a mess than its predecessor. The agreement allows the ITU to move forward and establish a firm technical foundation on which to specify a family of 3G standards.

"To have one single air interface was an initial aim, but I am not sure if it was ever a realistic goal," said Ericsson's senior product manager for 3G mobiles, Scott Moorhen. "It was too big a step to get all parties to magically agree to one standard. You have to understand the realities of different market forces and network circumstances in different areas. To arrive at a family of standards is the best result we could have hoped for — we have moved from many standards to a handful. From 3G to 4G hopefully there will be further consolidation."

In a review of the agreement, Robert Egan, an analyst with the Gartner Group in the US, noted that the "stark differences between the GSM and IS-95-based approaches caused technical and political gridlock, which delayed the 3G specification

process and would have prohibited handset designs based on a common platform". Egan is yet to be convinced that the agreement will result in a unified approach.

"The announcement lacks information on how the two vendors plan to resolve several technical details that have been at the centre of controversy," he said. "We believe that the companies will advance a position that mitigates the substantial differences in the air interface technologies, enabling a high-end global handset design. However, we remain convinced that no single global standard will result because a unified standard does not, in and of itself, lower infrastructure costs to wireless carriers; therefore, there is no compelling business reason for wireless carriers to back a unified standard."

The ITU chooses its words carefully, describing the probable result as a single flexible standard with multiple access methods. It will meet the needs of the many different mobile operational environments around the world. Operators will be able to choose the radio interface that best addresses their specific regulatory, financial and customer needs. It is obvious, though, that the focus will now be on ensuring that despite the different technologies, the resulting services are as transparent as possible. Transparency will have to be provided through handsets.

According to an Australian Communications Authority (ACA) representative, in lieu of a single standard, we will need to see flexible phones. Consumers will need multimode, multiband handsets in order to access both domestic services and true global roaming.

What is 3G anyway?

Very little of the exact detail of the third-generation standard has been decided, but its aims are very clear: to enable greater mobility, better and more powerful access and true mobile multimedia. Activities such as simultaneously wireless video chatting to friends in the UK and the US, downloading crucial information while on the train ride home, or taking a digital photo of a scene and immediately sending it to someone are all possibilities with 3G.

As described in our 'Phone talk' feature last year (see APC December 1998, page 76), your handset will allow transparent access to voice and data communications and will link wirelessly to

other devices. The idea is to be able to make and receive calls and access services in multiple formats. The technology is meant to allow the extended services by increasing the size of the pipes and the speed of data transmissions.

The limitations of small LCDs on phones will probably be overcome by linking them wirelessly to other devices, such as laptops or PDAs.

The high bit-rates of third-generation systems will far exceed anything available today, an ITU explanation of 3G states. Third-generation systems bring the promise of fast wireless access to the Internet, real time videoconferencing and broadcast, full-motion videophone, video and audio email, or access to any type of

information stored on desktops at home or at work, it states.

Systems developed on 3G will be much more than a new class of telephones; they will represent the ultimate personal accessory, combining the features of a telephone, computer, television, newspaper, library, diary and more, the ITU states.

"The most tangible benefit of 3G will be speed," Ericsson's Moorhen said. "It also introduces mechanisms and options to allow a more complete set of services wherever you are. 3G will be set up to support a virtual home environment, so the same set of services will work wherever you are. The services themselves will also get more powerful and more elaborate," he added.

"We would have needed new handsets anyway with the move to 3G, but they will need to be more complex and therefore more expensive," said Daniel Baker, an analyst with Ovum.

However, the ITU hopes handsets will be reasonably priced. In a release on the March agreement the ITU states: "There are already many multimode/multiband mobile units appearing on the market to meet the evolution needs of today's systems . . . by early next century there should be negligible impact in areas such as power consumption, size or cost, due to the flexibility defined within the IMT-2000 standard if harmonisation efforts during the more detailed definition stage are strongly focused towards the needs of the end user."

Tony Cullen, Ericsson's 3G campaign manager, said the price of new handsets is hard to quantify. "I believe that initial prices for handsets with data capability will be at the upper end of existing terminal prices, but at a price which appeals to business users (the likely early adopters)."

Cullen believes that prices will drop after an initial high anyway, but other factors would help the process, including a smaller number of frequency standards on which handsets will be based, more terminal manufacturers and a much higher customer base. "There will be a much wider range of terminal devices ranging from basic handsets with limited data capabilities to fully configured minicomputers which are also able to be used as phones," he said.

Detailed specifications of the 3G standard will be developed between June and November of this year, and the challenge is to ensure that they minimise undue technical complexities relating to deterioration of performance, while catering for multiple operating environments.

Cynicism is still apparent, but at least there will be no incentive on either side to stymie the development of either technology.

So what will it look like?

According to Ericsson representatives, the 3G family will involve three modes of operation, which support W-CDMA and cdma2000 across a number of spectrums, and Enhanced Data Rates for GSM Evolution (EDGE). In other words, there will be one time division multiple access (TDMA) and 'one' CDMA solution. EDGE is a second-generation GSM and D-AMPS enhancement. It is included despite its classification as second-generation, because it will increase data speeds up to

384Kbps with a bit-rate of 48 to 69.2Kbps per time slot — the ITU's classification of 3G requires data rates of 384Kbps to 2Mbps. "EDGE gets existing TDMA technologies up to scratch and is a solution for operators that wish to use the existing GSM or TDMA spectrum," said Moorhen.

The focus, however, is on the three modes, and all are expected to supply speeds up to 2Mbps, according to Moorhen. The first, the multicarrier cdma2000 solution (from the Qualcomm camp), will use smaller bandwidth but aggregate carriers to achieve the required bandwidth.



cdma2000 is based on the existing IS-95 technology, and there will be three 1.25MHz-wide carriers joined to supply the required bandwidth. It will use the 800MHz spectrum in Australia and 800MHz and 1,900MHz in the US. The direct spread W-CDMA mode uses a single carrier at 5MHz wide to achieve the high data rates, and will use the frequency set aside for 3G by the WRC.

The third mode, time division duplex, is the indoor, unlicensed component of the W-CDMA solution.

Those planning to use the set-aside 3G spectrum will probably choose W-CDMA and those already using IS-95 will choose cdma2000, said Moorhen.

"It's a spectrum issue. The modes for 3G are frequency-independent. You can apply any of the four modes in any of the available frequencies — the ITU doesn't specify what you use where — but there will be natural matches with those modes from a frequency point of view. In the US, the IS-95 technology will use 800 and 1,900MHz spectrum; in Europe they will use the direct spread W-CDMA technology based on 2GHz," said Moorhen.

Cullen added that it was clear there was a volume market for both W-CDMA and cdma2000; the necessity for both has been established.

Cullen said for a time there was the risk

that there would be too many standards, leading to an overly fragmented market that would not achieve the required volume to recoup the costs of supplying such advanced services. "The number of standards is decreasing, so we can focus on the specifics of getting the product and service right." And Ericsson can address the \$9 billion IS-95 market, he said.

"We haven't achieved a single-mode standard, but there is more certainty. It is a far more stable environment. The amounts of money that will be invested in 3G are mindblowing. All operators now

have an evolution path to go to. No doors have been closed."

Cullen added that arguments focusing on one second-generation technology versus another are "old fashioned". Because there is now a solution for all players, these arguments are irrelevant.

However, players competing to implement second-generation networks supporting either of the two major technologies are continuing to talk up the advantages of their particular solution, including its 3G migration advantages. Carriers need to make decisions based on what is available now and into the future; they have said that many second-generation systems have not been fully installed, let alone become profitable.

Telstra is not convinced that discussions in the last few months will result in a simple 3G solution. "There are still many issues to sort out and there is not a lot of apparent activity," said Telstra CDMA manager Greg Young. "We have a healthy degree of scepticism but we remain optimistic."

"We have heard all of the rhetoric, but we are waiting to see if the grassroots action occurs and at the moment, there is not much left after you scratch the surface. A couple of kisses and a few hugs across the table doesn't mean its all OK. Four modes in different frequencies . . . there is

still a lot of activity required to bring together the commonalities."

Young added that carriers need to make existing and future second-generation services workable and profitable before taking the next step. While enhancements are on the way such as General Packet Radio Service (GPRS) and EDGE for GSM, and Bluetooth for the wireless linking of devices), at the moment data rates of only 9,600bps are possible.

"From the customer perspective, 3G is the last thing on their minds. The amount of data traffic on our networks is in the very small single-digit percentages. Will they throw away their old handsets and run out and purchase a new one to get high-speed data when so few use it?"

Young conceded that the slow data rate now on offer would improve, and that could increase the amount of data traffic, but the cost of accessing higher-speed services would need examination.

"A customer using 9.6Kbps for data uses one voice channel that could be carrying a voice call. To deliver higher speeds, GPRS will use multiple time slots, so to get a 19.2Kbps data rate it will need to use two channels — it grabs the resources of two voice calls, so the carrier loses the charges from the other voice call. So what do you do? Charge the data user two, three, four times more depending on how many channels they use? Will they pay? Will there be enough room left to meet voice traffic demand?"

Young said Telstra was watching next-generation developments, but would be testing second-generation enhancements on both of its networks first. "There are a number of things that need to be done to help users now."

Young said the most important issue in Australia is coverage. The 3G modes based on the 2GHz range are appropriate for smaller countries in Europe that already have good coverage on other frequencies, but perhaps not for Australia.

"At the moment we only cover a very small area of the physical country here and customers want greater coverage before all else. The higher the frequency, the less built-in coverage there is, so the range for

each station is much reduced." Young said no matter what the technology, the shorter the wavelength is, the less robust it is.

"We need to know how 3G will deliver high-speed data and all its other advantages to people across Australia on these higher frequencies.

"We need to understand how the two different platforms will evolve, and what the constraints for both are. At this stage, we have an open mind about which to evolve to 3G — it may be both," Young said.

A key issue is upgrade costs, both for the existing GSM infrastructure and for IS-95, which is now being implemented.

Ericsson's Cullen commented: "Both CDMA-based 3G standards will be able to supply data up to 2Mbps.

The question then becomes what the coverage and capacity trade-offs are for each, and at this stage, it is too early to make comparisons on this."

The future

Despite the agreement between the two camps, the bunfights appear to continue about the perceived dominance of the two opposing second-generation standards.

Perhaps this is the best illustration that there is still a lot of life left in both the GSM and IS-95 technology-based networks.

The claims and dreams of the third generation are still a few years away, and second-generation enhancements will be implemented first. The first commercial 3G operation will start in Japan at the end of next year at the earliest. Second-generation enhancements will not only supply the technology and devices to take advantage of more bandwidth-hungry services and applications, but will also supply the carriers and the equipment providers with an indication of just how popular such services are likely to be. (For more detail, see 'Phone talk', APC December 1998, page 76.)

More concrete moves towards second-generation enhancements have been made since last December, however. Optus, for example, has announced plans to pilot GPRS in the first quarter of 2000, and follow it up with a commercial service in the second half of the year. No pricing details have been released. The company

will also trial the Wireless Application Protocol (WAP) in June, ready for a September public launch. WAP enables the transition of Internet-style browsing data on a handset.

Detailed technical information and bargaining are crucial to network equipment suppliers, handset manufacturers and carriers, but ultimately, all users will care about is getting a transparent communications facility that is easy to use and supplies all of the grunt to run the required applications. It appears they will get the grunt — who knows at what cost — but the detail on just what will be supplied with each service and the comparable quality of both is still unclear.

Probably all that most business users and travellers will want to know is: will my 3G phone work across the world? It seems the answer to this one depends on mobile phone users.

"Do we want handsets that work in both modes? Yes — maybe," said Cullen. "If there is a market, we will supply them, because it is best to allow for this in the handsets."

"It will be easier to manufacture multi-standard devices, but we are not sure if the market will be there," added Moorhen.

We will have to wait a few more years to find out. Even when the first direct spread W-CDMA network is installed and operational in Japan, its focus will not be access to data services. Japan had a dormant mobile market in the 1980s but it took off in the 1990s. "Now they have 40 million users and need more bandwidth. Their 3G drive is to relieve the capacity for voice," Moorhen said.

This may also be the case for some time in other areas, including Australia. Gartner Group analyst Geoff Johnson sees a murky future. "Users can expect that IMT-2000 standards will begin to promote global roaming across both geography and network technologies from 2000, but practical deployments will lag until 2003," he said.

"Users must not expect that manufacturers and network service providers will selflessly adopt IMT-2000: they need to recover their investment in previous generations of equipment. Because most licensed carriers are committed to particular first and second-generation technologies, relatively few new market entrants after 2000 will adopt IMT-2000 equipment exclusively, as carrier markets consolidate globally."

One in four Australians may own a mobile phone by 2004, but just which technologies the services will be supplied on and what we will use them for are questions still too difficult to answer. ■



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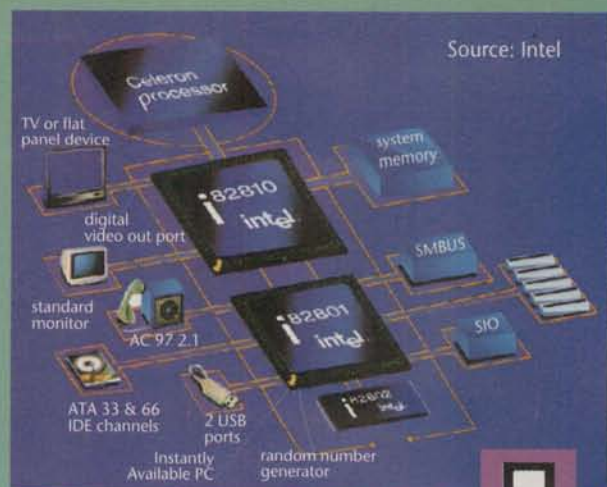
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ON SALE 1 JULY

Intel is promising its next-generation chipsets will revolutionise PC design and bring down prices for the average user. How do the 810 and 820 chipsets measure up? BY NATHAN TAYLOR

Your next chipset



The last major chipset upgrade from Intel was the BX, which officially marked the debut of the 100MHz bus. Several chipsets have been developed since, but they have all been slight variations of the same architecture, designed to please cost-conscious OEMs. The 440BX remains the most commonly used chipset, but this is likely to change with the release of the 810 and 820 chipsets.

The recently released 810 chipset, code-named 'Whitney', is an all-in-one solution designed for budget PCs. By integrating graphics, audio and modem functions directly into the chipset, the cost of producing PCs will be substantially reduced. PCs based on the 810 chipset and priced well under \$1,000 should appear this year.

The 810 only supports a single processor architecture and uses Intel's 370-pin PPGA packaging (unofficially known as 'Socket 370'). At the moment only Celeron processors are manufactured in this form factor, but Intel has plans for Socket 370 Pentium III systems. Technically, the 810 also supports Slot 1, although Intel is discouraging this, and current Pentium III processors have problems with the chipset.

The 820, or 'Camino', chipset is designed primarily as a replacement for the BX chipset and is due for release in the second half of this year. It will support many of the new features of the 810, but it will not have an integrated graphics controller. It will also increase the bus speed of the system and introduce a new memory type to PCs. The 820 chipset will support both Slot 1 and Socket 370 chips, along with single or dual processor configurations.

Looking further ahead, Intel is planning an 840 chipset, codenamed 'Carmel'. Designed for Slot 2 (Xeon) processors, the

840 will support four processors, a front side bus at 133MHz, 66MHz PCI and up to 8G of Rambus Dynamic RAM (RDRAM).

Architecture

Both the 810 and 820 chipsets represent a significant architectural departure for Intel. The BX and other current chipsets use the 'north' and 'south' bridges. The north bridge is the link between the chipset, memory, PCI bus and CPU, while the south bridge runs on the PCI bus and connects the chipset, BIOS and IDE controller.

The new chipsets, however, use what Intel is calling an 'accelerated hub architecture', in which the chipset components do not communicate over the PCI bus. Instead, they use a specialised bus running at twice the speed of PCI. Collectively, the chipset components form a hub from which all system buses originate. One big potential advantage of this approach is that the IDE connection, universal serial bus and BIOS no longer hang off the PCI bus, leaving room for other devices.

Details on the planned configuration of the 820 are scarce, but Intel has been more forthcoming with information on the 810. The chipset consists of three separate chips: the Graphics and Memory Controller Hub (GMCH), the I/O Controller Hub (ICH) and the Firmware Hub (FWH).

The Graphics and Memory Controller Hub, which controls the memory access and graphics functions of the chipset, is available in a standard format, the GMCH, which sports a 4M graphics cache, or the cut-down GMCH0, which relies totally on main memory for graphics functions.

A similar naming convention is used with the two I/O Controller Hub variants. The ICH differs from the ICH0 in the num-

ber of memory and PCI slots supported. The standard ICH chip will support up to six PCI devices; it uses the ATA/66 disk interface and has Alert on LAN capabilities. The cut-down ICH0 chip will support only four PCI devices and features ATA/33.

The two variants of the GMCH and ICH create four possible combinations overall. Only three of these combinations are sold by Intel.

GMCH0 combined with ICH forms the standard 810; GMCH0 plus ICH0 creates the 810-L chipset; and the GMCH/ICH combo is known as the 810DC-100. The FWH, which holds the BIOS, will remain consistent across models. For manufacturers, the three models cost \$US27, \$US23 and \$US30 respectively (when purchased in quantities of 10,000 or more). Even with the integration of graphics and other features, this is significantly cheaper than BX chipsets.

Front side bus

The 810 chipset will support a 100MHz memory bus and the processor will still run in multiples of 66MHz. Consequently, it will require PC100 SDRAM to run stably. Memory access for Celeron systems will receive a boost as a result.

The 810 will also be technically capable of running at 100MHz on the processor segment. This is in preparation for later processor models planned to run on a 100MHz front side bus (FSB). Undoubtedly, it's also true that a number of motherboard manufacturers will produce boards suitable for overclockers, allowing them to run Celerons designed for the 66MHz bus at 100MHz and more (motherboards we looked at run at up to 153MHz). Later this year, when Intel

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133MHz

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announces the 810-e chipset (formerly known as the 815), a 133MHz FSB will be officially supported. Contrary to rumour, Intel has not blocked system bus clock-speed overclocking in the latest Celerons, although the multiplier is still locked.

The real bus action will happen in the 820 chipset, where Intel has upped the FSB speed to 133MHz. If the chipset supports SDRAM — and there's no guarantee that it will — then special SDRAM certified to run at 133MHz will be required. Most current SDRAM chips will fall over at this speed.

Apart from making overclockers happy, the speed upgrade will support Intel's next-generation processors, although Intel's timetable for releasing such high-speed processors is unknown.

Other buses

The first thing you'll probably notice about 810 and 820-based motherboards is the complete lack of ISA slots. For years, Intel has been saying that ISA is dead — now it has finally happened.

Another interesting feature of both the new chipsets is support for the Audio Codec '97 (AC '97) interface for the connection of audio outputs. AC '97 provides a direct connection between the chipset and external connections for phone lines, microphones and speakers. If used, the bus allows the main system processor to do the work that would otherwise be performed by a dedicated soundcard or modem chipset. Such 'soft-audio' and 'soft-modem' features again provide cost savings to OEMs, although this creates a higher CPU load.

That said, it is not necessary for vendors to use the AC '97 connections for audio functions, and many don't seem inclined to do so. One Dell product manager told APC that AC '97 audio "is not quite ready for prime time". A key motherboard differentiator will be the provision of real PCI or USB-based sound and modem hardware. These will undoubtedly be superior to virtual devices based on AC '97 and will use up far less processing power. There is a special slot provided on 810 motherboards for soft modems and audio cards. The 810-based motherboards APC has looked at all have integrated audio chips.

Both chipsets will support Ultra ATA/66 (see APC June, page 112), although some variations of the 810 chipset will be limited to Ultra ATA/33. Given the minimal practical performance boost provided by the interface, ATA/66 is not a big advantage.

Finally, while the 3D graphics integrated into the 810 chipset will continue to run on a 2x AGP bus, the Camino chipset will

finally introduce us to 4x AGP. Rather than running at 66MHz like the current 2x AGP, 4x AGP runs at 133MHz, delivering twice the memory bandwidth of 2x — just over 1G per second in total. The usefulness of this will depend on 3D developers' willingness to commit to using large textures and advanced techniques that benefit from AGP. Certainly, no developer besides Intel is making much use of the AGP bus right now.

Random number generator

Both chipsets will feature a new random number generator (RNG) in the firmware hub, designed to help encryption techniques. Right now, computers are incapable of producing 'true' random numbers, instead using algorithms that define a sequence of numbers. The point at which you jump into this sequence (programmers usually link this to the time that the number is sampled) determines which number the PC produces. However, this is a potential security risk, because a cracker could theoretically emulate the exact conditions at which the sample is taken, producing the same number and hence the same key.

With the new technique, Intel measures the amount of electrical noise produced in a special resistor inside the chipset, producing a value that is impossible to replicate algorithmically. The numbers generated appear in a special, constantly updated register that can be accessed with normal register read calls.

Unfortunately, it is unclear whether the RNG produces numbers with equal probability for all values. For instance, the noise measurement could well be 'sticky' around a certain range of numbers. Local Intel staff could not confirm that the spread of numbers would make the RNG useful to applications other than security.

810 graphics controller

The biggest cost saving delivered by the 810 chipset is clearly the integrated graphics controller. It's not, as expected, based on the i740, but on a more recent architecture, designed especially for the chipset.

Intel will share the system memory between applications and graphics functions in the 810. Rather than having a large chunk of dedicated memory, the 810 borrows from the system memory to provide for the PC's graphics needs, in a manner similar to UMA and the architecture used by SGI in its Visual Workstations.

One version of the chipset, the 810DC-100, comes with 4M of graphics cache memory — a special segment of high-speed

memory devoted to graphics functions. It's not enough to provide for all the memory requirements of the graphics controller, but it does speed things up dramatically. Intel claims there is at least a 30% increase in performance if the cache is used.

The graphics controller will immediately absorb 1M of system memory on bootup to provide basic VGA output for the system. Later, the controller will dynamically assign and free more system memory as needed. For instance, to switch to a higher resolution in 2D mode, the chipset will assign a larger frame buffer, taking a chunk out of the system memory. When 3D features are required, the controller will take additional memory for Z-buffer, textures and a command buffer. Running at the highest 3D resolution of 1,024 by 768, the controller can request 10M and more of the system's memory from the operating system.

Buyers should be warned that it does increase system memory requirements. It's a good idea to have a lot of system memory if you're running on an 810 chipset — 64M at the very least.

The 810 will not have an additional AGP slot, so if you want a different graphics controller, you'll need to use a PCI card. The chipset supports various types of output, but it is up to the motherboard manufacturer to implement them.

820 memory architecture

The most talked about feature of the 820 architecture is its support for RDRAM. We discussed Rambus memory a few months ago (see APC May 1999, page 87), so we won't go into too much depth here.

Intel has not officially announced continued support for SDRAM in the 820, but it should be equipped with a memory translator hub, which allows the system to use either SDRAMs or RDRAMs. As noted earlier, most current SDRAMs will not run at 133MHz. There is currently a big question concerning the viability of RDRAMs, as manufacturing problems plague memory manufacturers. Undoubtedly, if Intel supports SDRAM, then this will continue to be the most common type of RAM in new systems for some time.

Eventually, RDRAMs will make their way into all Intel chipsets. Likewise, the other features of the Camino chipset will make their way into planned chipsets from Intel — and as always, the other chipset manufacturers will follow.■

For benchmarks on 810 motherboards, see First Take on page 42.



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Pentium

III

goes to Hollywood

You've seen the ads, but should you buy the machines? Competitively priced desktop systems based on Intel's Pentium III processor are now widely available. In this feature *APC* tests and reviews seven of them, and finds out what PIII *really* means for games and business applications.

By Darren Ellis

Nebulous Intel claims about how wonderfully new and exciting the world will be with Pentium IIIs have turned out so far to be just that: nebulous. Until developers take advantage of the new instructions, the biggest consumer benefit will remain increased clock speed.

This is not to say that the Pentium III does not have potential, it does. The new instruction set on the chip will provide huge pay-offs, but not until developers embrace it more. Gamers will absolutely love the processor, as will voice-recognition fans, but there is little new there to tempt businesses.

It's hard to test Intel's claims because many products that support the new instructions are still in their infancy. Still, the examples we've seen have been quite impressive. Just running our benchmarks under DirectX 6.1 (which features Pentium III support) showed huge improvements over DirectX 6.0.

In the April 1999 issue of *APC* (page 95) we took a good look at what the new instructions, called Internet Streaming

SIMD Extensions (Internet SSE) are, and what they offer. In short, the new inclusions are the Single Instruction Multiple Data (SIMD) feature, the new cache controller, and the biggest bugaboo to date: the processor serial number (PSN).

SIMD is a new way for the processor to perform multiple (up to four) calculations simultaneously with a single instruction. Voice recognition and 3D (both processor-hungry applications) will make good use of this feature. The advancement here over Intel's previous MMX technology is the ability to perform floating point *and* integer calculations.

The new cache controller will prove to be a winner. Previously, the cache was little more than a dumb information dumping ground where frequently accessed data was held readily, but now Intel has given it some smarts. Depending on what tasks are being performed, the developer can decide what needs to be stored there and how often it must be checked. This will prevent any slight lags when the cache is being accessed without good reason.

Lastly, there is the PSN. Although well intentioned, this inclusion has caused a great deal of controversy as people feared it could be used to track a user's movements and habits. A little paranoid maybe, but Intel has since backed down and provided a way to keep the PSN secret.

The reviews

For this issue of *APC*, we threw the doors wide open and let the Pentium III systems in. Our only stipulation was a minimum of 64M of RAM and Windows 98 installed. The Hewlett-Packard VLi8 was the only system not available with Windows 98 pre-installed. For the purposes of our review, this machine was reformatted and Windows 98 installed to run our test suite.

We did not split the machines into separate categories, as we wanted to take a look at the wide spectrum of Pentium III systems available on the market. In the following pages you'll see bare meat-and-potatoes machines, business machines, multimedia powerhouses and jaw-dropping systems.



How we tested

To test the relative performance of today's most advanced PCs, APC Labs used the Ziff-Davis Winstone 99 and WinBench 99 suite of benchmark software.

Winstone 99 runs a suite of modern business and high-end processor intensive and graphics applications. The run of these applications is timed to measure how long the system takes to complete these tasks. The Winstone benchmark is split into two tests — the **High-End Winstone 99** and **Business Winstone 99**.

Previous versions of the Winstone suite allowed us to run both the Business and High-End tests on systems that met the necessary memory requirements. Winstone 99, however, requires Windows NT 4.0 to run the High-End Winstone test, which tests the system using performance intensive applications. Since Windows 98 is still the preferred operating system for PC users, we tested all PCs under Windows 98 for this feature. Therefore we were unable to run the High-End Winstone tests.

The **Business Winstone** result is a comparative score of how fast the computer could complete the various business applications.

WinBench 99 contains a set of sub-tests, each designed to find out the actual speed of each component of a PC.

Business and High-End Graphics WinMark 99 measures the system's graphics performance when performing video tasks associated with common business applications, as well as demanding multimedia and 3D applications. For the technically minded, they replicate the GDI calls made when running Winstone, without the other application overhead.

Business and High-End Disk WinMark 99 provides a measure of how a system's hard disk subsystem handles a load equivalent to that demanded by the business applications used in the Business Winstone 99 test.

CPUMark32 lets us compare the speed of the processor, memory and cache sub-systems.

CD-ROM WinMark 99 tests the CD-ROM drive, adapter and software drivers. The result is an overall measure of how fast the CD-ROM components transfer data.

3D WinMark measures the performance of all of the components within a PC's 3D graphics subsystem. Using Direct3D's retained mode, it uses the Windows drivers to put the 3D graphics hardware to the test.

All the PCs tested were shipping versions available to the general public, unless otherwise stated. Please note that because of the lead time between testing the machines and publication, some specifications and pricing may have changed. Be sure to check this information with the vendor before purchase.

These tests were performed without independent verification by Ziff-Davis, and Ziff-Davis makes no representation or warranties as to the results. Winstone and WinBench are registered trademarks of the Ziff-Davis Publishing Company.

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Advantage Pro MP450

ADELONG

The Advantage Pro was one of three 450MHz systems we tested. It put up a valiant struggle, in most tests coming either second or third out of the 450MHz PCs. Its Diamond Viper video card did not do well in most graphics tests (it came second last in both tests), although it was



not far behind the next couple of systems' video cards.

The exceptions were the Ziff-Davis CD-ROM WinMark 99 and 3D WinMark tests, where it scored particularly well. It came third out of all the systems in this review

with its CD performance and second with its video card's 3D results.

The Advantage Pro came last in the Ziff-Davis CPUMark32 and FPU WinMark tests, but all three of the 450MHz machines brought up the rear and the competition between them was very tight. When you take into consideration that it has half the amount of RAM of the Peripherals Plus machine, it becomes apparent that it still performed quite well. Its 10G hard drive fared better, coming third last in both tests, but it was well above the slowest result.

If you want pumping bass and crystal audio, then you can't go wrong with the Adelong system's Altec Lansing speakers. This set, the ACS45.1 PowerCube satellite and subwoofer theatre system, are not quite as good as the standard Altec Lansing set included with the Dell

Dimension, but they aren't far behind.

Overall, the Advantage Pro is an average machine, except for two stand-out features: its high 3D WinMark results and its price. At \$2,950, the Advantage Pro is the second cheapest machine reviewed and represents good value for money.

Darren Ellis

■ Distributor

Adelong

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<http://www.adelong.com.au/>

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\$2,950

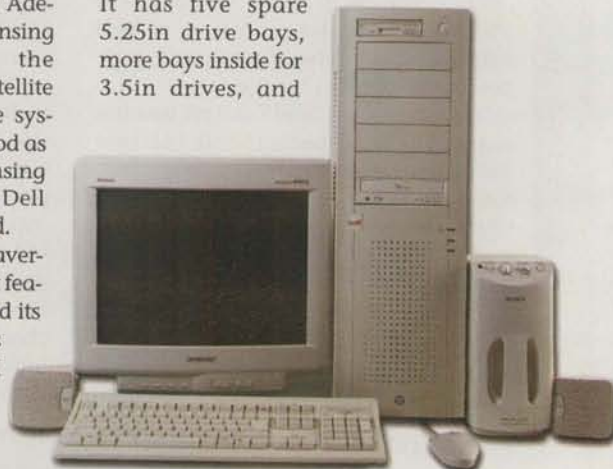
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SuperO Velocity 500MHz

BEYOND

You've heard of the tower case and the minitower case, but now it's time to meet the megatower. The SuperO Velocity's server-like case dwarfs anything we've seen on a desktop before. It has five spare 5.25in drive bays, more bays inside for 3.5in drives, and



still enough room to swing a relatively large cat. In fact, forget the desktop; we'd recommend putting the floppy and CD-ROM drives in the top slots and hiding the mega-tower under your desk.

The SuperO Velocity's components were up there with the top PCs in this review, which is just as well considering its price was also right up there. Its 500MHz Pentium III processor and 128M of memory proved a formidable combination, producing above average scores in Ziff-Davis' CPUmark32 and FPU WinMark. Unfortunately for Beyond, the Gateway Performance 550 provides equal to better specifications for considerably less money. The Dell Dimension was more expensive than the SuperO Velocity, but it also includes much better components.

The SuperO Velocity was one of four machines in this review to use a graphics card based on the nVidia Riva TNT video controller. However, its graphics performance was far from ideal. It achieved only average scores in Ziff-Davis' Business and High-End Graphics WinMark 99 tests and 3D WinMark.

Beyond was the only vendor to choose a SCSI disk interface—a top drawer Ultra2 SCSI LVD controller and a 10,000rpm Seagate Cheetah hard disk drive. It scored highest in both the Business and High-End Disk WinMark 99, but the Dell system, which used an Ultra ATA/66 drive, was not far behind.

To round off the system, Beyond includes a Creative Labs Sound Blaster Live soundcard and Sony speaker and subwoofer combo. The speakers are attached to the sides of the 17in Sony monitor and produced very agreeable sound.

Josh Mehlman

| | |
|---------------|--|
| ■ Distributor | Beyond |
| ■ Phone | (02) 9417 3688 |
| ■ Online | http://www.beyondcomputers.com.au/ |
| ■ Price | \$4,995 |
| ■ In short | Expensive, but its disk performance can't be beaten. |

Dimension XPS T550

DELL

The latest Dimension PC from Dell may be the most expensive system reviewed in our roundup, but it is bursting to capacity with goodies. The hard drive is the



biggest of the lot, and almost equal to the Beyond SuperO Velocity's in terms of performance. This is surprising when you consider that the Dell machine has an Ultra ATA/66 drive and the Beyond machine has a SCSI controller.

In almost every regard, the Dimension XPS T550 finished at the top of the class. The Dimension and Gateway Performance 550 were the only systems to feature the latest 550MHz Pentium III processor, but these showed only a marginal improvement over the 500MHz systems. The Dimension was fastest in the main performance tests (Ziff-Davis Winstone 99 Business Winstone, WinBench 99 CPUmark32) and aced the graphics and disk tests. All up, the Dell screamed along, no matter what we threw at it.

Dull system performance details aside, the XPS T550 is fun. The video card installed is a Riva TNT2-based Diamond Viper V770 and is the only system here to feature one. With 32M of SDRAM there is little wonder it sailed through the graphics tests. It looked great, but with a 21in monitor instead of the 19in supplied it would be fantastic. Another nice touch is a four-button MouseMan Wheel from Logitech. It looks weird, but fits well in your hand and is extremely comfortable to use.

Aurally, it is a wonder. To take advantage of the audio from the Sound Blaster Live soundcard is the latest satellite speaker and subwoofer combination from Altec Lansing, the ADA 880. It has four satellites and a mean-looking subwoofer. Featuring full Dolby Digital, this system is ready to really annoy the neighbours, no matter how far away they are.

Darren Ellis

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KTX Premium Quicksilver PIII 450 MD-L

EDGE

One of the cheapest PCs in this review, the KTX Premium Quicksilver PIII 450 MD-L has similar components to the other budget PCs reviewed. Like the Adelong and Peripherals Plus entries, it has a 450MHz Pentium III processor and 64M of memory. It has an 8.4G hard disk drive, which was also a popular choice, and a Riva TNT-based graphics card, as did three of the other systems. It comes with a 17in Samtron monitor, which is very good quality for the price.

It may just be a whine, but the KTX we tested came with a serial-bus mouse and a



keyboard that had a five-pin DIN connector and a dongle to plug it into the PS/2 keyboard socket on the motherboard. There's nothing wrong with this, but it does indicate these components have been sitting in the warehouse for quite some time. Also, the Philips DSS370 speakers took up far too much desktop real estate, as well as two power points, and plugging them in involved a complex tangle of cables. But when all this was done, the speakers sounded pretty good.

The KTX was slightly more expensive than the other PCs at the budget end of this review, but it outperformed the Adelong and Peripherals Plus systems in almost every test. Its scores were above average in the Ziff-Davis Business and High-End Disk WinMark 99 tests as well as in the CD-ROM WinMark 99 test. It beat the other two 450MHz Pentium III systems in the CPUmark32 and FPU WinMark tests. However, the KTX did not score well in the 3D WinMark test. Although its 3D performance was mostly good, it had a problem working

at a resolution of 1,024 by 768, which brought its overall score down.

Josh Mehlman

| | |
|---------------|---|
| ■ Distributor | Edge Technology |
| ■ Phone | (02) 9353 9200 |
| ■ Online | http://www.edge.net.au/ |
| ■ Price | \$3,199 |
| ■ In short | A good performer at a very decent price. |

Performance 550

GATEWAY

Gateway has finally succumbed to the marketing bug, giving its PCs cute names instead of long strings of numbers and letters. Aside from the name change, the Performance 550 is a classic Gateway system.

Gateway was one of two vendors (the other was Dell) that managed to submit a system with the recently released 550MHz Pentium III processor. Not surprisingly, then, the Gateway scored very well in the Ziff-Davis CPUmark32 and

equipped PCs, ranking it an impressive third place in both tests overall. Its scores in the Disk WinMark 99 tests were average to poor, but its Business Winstone 99 score was above average.

At \$4,299, it includes some great extras, such as a DVD-ROM drive, a huge hard disk drive, the fastest available processor and Corel WordPerfect Office Suite 8. The Performance moniker is apt — while it is a good performer, if you're looking for the latest multimedia components, you may want to look elsewhere.

Josh Mehlman

| | |
|---------------|---|
| ■ Distributor | Gateway |
| ■ Phone | 1800 500 338 |
| ■ Online | http://www.gw2k.com.au/ |
| ■ Price | \$4,299 |
| ■ In short | Good value and performance, but not all that exciting. |

Vectra VLi8

HEWLETT-PACKARD

There were two systems to feature a 500MHz processor — the Hewlett-Packard Vectra VLi8 and the Beyond SuperO Velocity. Both were good performers for the most part, but with half the memory of the Beyond, the Vectra VLi8 couldn't quite keep up. We should point out that the Vectra VLi8 does not come with Windows 98 installed, it uses Windows 95 instead. We had to reformat the hard drive and reinstall Windows 98 to run our test suite.

Both of these machine's CD-ROM drives also scored the highest in the Ziff-Davis CD-ROM WinMark 99 test, but the Vectra really fell down when the hard drive was put under pressure. It was the slowest in

both disk tests — by quite a margin in the Business Disk WinMark 99.

We could not get the Ziff-Davis 3D WinBench test to run at all, no



FPU WinMark tests, swapping first and second places with the Dell Dimension.

One of the big advantages of buying a Gateway system is that you can customise the components, but it looks like Gateway is getting a little complacent in its choice of components. The graphics card is based on the nVidia Riva TNT chip, while arch rival Dell is already starting to use the TNT2 chip in its systems. Gateway lets you add a Voodoo2 3D accelerator card (why?), but you can't change to a newer graphics adapter. Similarly, the Gateway's only soundcard option is a Creative Labs Sound Blaster PCI64; this is not a bad card, but it's starting to look a bit old compared to the Sound Blaster Live and Diamond MX300 cards in some of the other PCs in this review.

The Performance 550's performance in the Ziff-Davis Business and High-End Graphics WinMark 99 tests was the best of the TNT-



EDITOR'S CHOICE

● Dell Dimension XPS T550

HIGHLY COMMENDED

● Adelong Advantage Pro MP450

When you do a comparative review of a cross-section of systems with different processors, all aimed at different market segments, it is hard to choose a winner. When you take a look at the results from our tests, the Dell Dimension XPS T550 is a standout performer. It came tops in most of the tests but was unfortunately also tops in price — but with killer sound and video, a whopping hard drive, CD-R drive and the fastest Pentium III processor available, the price doesn't seem so bad.

Of the three budget systems we reviewed, the Adelong Advantage Pro MP450 looks the best value. Its performance was comparable to the similarly priced KTX and Peripherals Plus systems, and its hard disk drive is the largest of the three. Its speakers and soundcard are excellent for a budget system and its 3D performance was well above average.

matter how much we fiddled, tweaked, cajoled or pleaded. What we can tell you is that the integrated Matrox MGA-G200 graphics chip did rather well in the other graphics tests — scoring OK in the Business Graphics WinMark 99 and very well in the High-End Graphics WinMark 99 (especially when you gauge it against the competition's graphics cards).

This system is aimed at the corporate market, so you won't find any of the trappings that accompany a home system. What you will find, however, is a keyboard that has many extra buttons and functions. This multimedia keyboard has buttons for the Internet and Windows controls, as well as audio input and output jacks for the bundled headset.

We're big fans of keeping skin on our fingers and knuckles, so the Vectra's screwless casing was refreshing. Once you've got the lid off, you won't find a great deal of room for expansion opportunities, but this helps keep the system compact and neat on your desktop. A nice design, overall.

Darren Ellis

| | |
|---------------|-----------------|
| ■ Distributor | Hewlett-Packard |
| ■ Phone | 1800 339 862 |



Anthony Jones
Managing Director
Intersource Projections
80 West Street
SYDNEY NSW 2000

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| | |
|------------|---|
| ■ Online | http://www.hp.com.au/ |
| ■ Price | \$4,399 |
| ■ In short | Good performance, let down by the hard drive. |

Pentium III 450 PERIPHERALS PLUS

Peripherals Plus provided this system with a Creative 3D Blaster Savage4 graphics card installed, at a time when the card was so new that the drivers didn't work well with it yet. Despite the

card's 32M of SDRAM, this driver incompatibility impacted the graphics test results. By the time you read this, however, there will be plenty of new drivers and patches available.

It scored last in both the Ziff-Davis High-End Graphics WinMark 99 and Business Graphics WinMark 99 tests, and pulled itself together a little for the 3D WinMark test, but was still lacklustre. Proper drivers should improve this greatly.

Fortunately, it was mainly the video card that had failings — the rest of the system may have struggled to raise itself above average in the pack, but did quite well against similarly configured machines.

The disk speeds of both the CD-ROM and hard drive were disappointing in some regards. The 40x CD-ROM was slower than other machine's DVD drives in the Ziff-Davis CD-ROM WinMark 99 test.

The hard drive coped best with the High-End Disk WinMark 99 with a

great result, but faltered with the Business Disk WinMark 99.

Once again, it's the old story of price versus performance. This is the cheapest system here, coming in at half the price of the Dell Dimension XPS T550 and \$255 less than the next-cheapest system.

Darren Ellis

| | |
|---------------|---|
| ■ Distributor | Peripherals Plus |
| ■ Phone | (02) 9630 3166 |
| ■ Online | http://www.perplus.com.au/ |
| ■ Price | \$2,695 |
| ■ In short | Not a bad system and easy on the hip pocket. |

INTERACTIVE

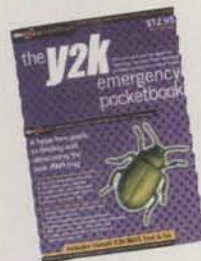
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SPECIFICATIONS

| Product | Adelong Advantage Pro MP450 | Beyond SuperO Velocity 500MHz | Dell Dimension XPS T550 | Edge KTX Premium Quicksilver PIII 450 MD-L |
|----------------------------------|---|---|---|---|
| Distributor | Adelong | Beyond | Dell | Edge |
| Phone | (02) 8344 3188 | (02) 9417 3688 | 1800 335 502 | (02) 9353 9200 |
| Online | http://www.adelong.com.au/ | http://www.beyondcomputers.com.au/ | http://www.dell.com.au/ | http://www.edge.net.au/ |
| Price | \$2,950 | \$4,995 | \$5,650 | \$3,199 |
| Warranty | 3 years onsite | 2 years parts, 5 years labour | 1 year onsite then 2 years RTB | 2 years onsite |
| Specifications | | | | |
| Processor | 450MHz Intel Pentium III | 500MHz Intel Pentium III | 550MHz Intel Pentium III | 450MHz Intel Pentium III |
| Secondary cache | 512K | 512K | 512K | 512K |
| RAM and type | 64M SDRAM | 128M SDRAM | 128M SDRAM | 64M SDRAM |
| Maximum RAM | 1G | 1G | 768M | 1G |
| Hard disk drive | 10.2G Western Digital AC310200 Ultra ATA/66 | 9.1G Seagate Cheetah ST39102LW Ultra2 SCSI LVD | 13.6G Western Digital AC313600 Ultra ATA/66 | 8.4G Maxtor DiamondMax EIDE |
| Hard disk controller | Intel 82371AB/EB | Adaptec AHA-2940U2/ | Intel 82371AB/EB | Intel 82371AB/Master IDE |
| PCI Bus Master | AHA-2940U2W PCI IDE controller | PCI Bus Master SCSI controller | EB PCI Bus controller IDE controller | |
| Hard disk file system | FAT32 | FAT32 | FAT32 | FAT32 |
| Monitor | 17in Diamond View 200ES | 17in Sony Multiscan | 19in Dell | 17in Samtron 70E |
| Graphics card | Diamond Viper V550 | Winfast 3D S320 | Diamond Viper V770 | Diamond Viper V550 |
| Video bus type | AGP | AGP | AGP | AGP |
| Video RAM | 16M SDRAM | 16M SDRAM | 32M SDRAM | 16M SDRAM |
| Video controller chip | nVidia Riva TNT | nVidia Riva TNT | nVidia Riva TNT2 | nVidia Riva TNT |
| CD/DVD-ROM drive | 48x AOpen 948E | 32x LG CD-ROM | 6x DVD plus Sony | 5x Samsung DVD |
| CD-ROM | | CD-RW | | |
| Soundcard | Diamond Monster Sound MX300 | Creative Labs Sound Blaster Live | Creative Labs Sound Blaster Live | Eagle |
| Speakers | Altec Lansing ACS45.1 speaker/subwoofer | Sony SRS-PC300D speaker/subwoofer | Altec Lansing ADA 880 Dolby Digital speakers with subwoofer | Philips DSS370 speaker/subwoofer |
| Internal modem | Yes | No | Yes | Yes |
| OS available | Windows 98 | Windows 98 | Windows 95, 98 | Windows 98 |
| Bundled software and accessories | None | None | Microsoft Works, McAfee VirusScan, games | Lotus SmartSuite, 12 months Internet access with EISA |

| Product | Gateway Performance 550 | Hewlett-Packard Vectra VLJ8 | Peripherals Plus Pentium III 450 | Key for 3D results |
|----------------------------------|---|--|---|--|
| Distributor | Gateway | Hewlett-Packard | Peripherals Plus | |
| Phone | 1800 500 338 | 1800 339 862 | (02) 9630 3166 | ✓ Capable — the card is capable of the given feature |
| Online | http://www.gw2k.com.au/ | http://www.hp.com.au/ | http://www.perplus.com.au/ | |
| Price | \$4,299 | \$4,399 | \$2,695 | ✗ Not capable — the card is not capable of the given feature |
| Warranty | 1 year onsite then 2 years RTB | 3 years onsite | 3 years onsite | |
| Specifications | | | | |
| Processor | 550MHz Intel Pentium III | 500MHz Intel Pentium III | 450MHz Intel Pentium III | ✗ Incorrect — while the documentation for this card's driver claimed to support the given feature, under our testing conditions the card was found to perform this feature incorrectly |
| Secondary cache | 512K | 512K | 512K | |
| RAM and type | 128M SDRAM | 64M SDRAM | 128M SDRAM | |
| Maximum RAM | 348M | 512M | 768M | |
| Hard disk drive | 12.9G Western Digital EIDE | 8.4G EIDE | 8.4G Quantum Fireball CR Ultra ATA/66 | |
| Hard disk controller | Intel 82371AB/EB PCI Bus Master IDE controller | Intel 82371AB/EB PCI Bus Master IDE controller | Intel 82371AB/EB PCI Bus Master IDE controller | |
| Hard disk file system | FAT32 | FAT32 | FAT32 | |
| Monitor | 17in Gateway EV700 | 15in Hewlett-Packard | 17in Diamond View | |
| Graphics card | Did not disclose | Did not disclose | Creative 3D Blaster Savage4 | |
| Video bus type | AGP | AGP | AGP | |
| Video RAM | 16M SDRAM | 8M SGRAM | 32M SDRAM | |
| Video controller chip | nVidia Riva TNT | Matrox MGA-G200 | S3 Savage4 | |
| CD/DVD-ROM drive | 4.8x Toshiba DVD | 32x CD-ROM | 40x BTC CD-ROM | |
| Soundcard | Creative Labs Sound Blaster PCI64 | Did not disclose | Integrated Creative Labs Sound Blaster PCI64 | |
| Speakers | Boston Acoustic BA735 speaker/subwoofer | None | Peripherals Plus speaker | |
| Internal modem | Yes | No | Yes | |
| OS available | Windows 98, NT 4.0 | Windows 95 | Windows 98 | |
| Bundled software and accessories | Corel WordPerfect Suite 8 | Hewlett-Packard TopTools, McAfee ViruScan, 3Com 10/100 Ethernet card | Lotus SmartSuite, Norton AntiVirus | |

RESULTS

| Product | Adelong | Beyond | Dell | Edge | Gateway | HP | Peripherals Plus |
|---|---------|---------|---------|---------|---------|-------------|------------------|
| Benchmarks | | | | | | | |
| Business Winstone 99 | 21.2 | 24.8 | 25.4 | 20.2 | 24.7 | 20.7 | 22.2 |
| CPUmark32 | 1,110 | 1,270 | 1,356.7 | 1,130 | 1,310 | 1,250 | 1,120 |
| FPU WinMark | 2,280 | 2,560 | 2,740 | 2,300 | 2,772.2 | 2,560 | 2,290 |
| Business Disk | | | | | | | |
| WinMark 99 (K/sec) | 2,613.5 | 4,426.7 | 4,225 | 3,450 | 3,127.1 | 2,163.3 | 2,603.3 |
| High-End Disk | | | | | | | |
| WinMark 99 (K/sec) | 6,512.1 | 14,000 | 13,900 | 9,436.6 | 5,634.2 | 5,530 | 8,920 |
| Business Graphics | | | | | | | |
| WinMark 99 | 170.6 | 191.7 | 206.5 | 179 | 200.1 | 175 | 151 |
| High-End Graphics | | | | | | | |
| WinMark 99 | 457.4 | 517.7 | 571 | 466.6 | 563.1 | 521.1 | 453.3 |
| CD-ROM WinMark 99: | | | | | | | |
| Overall (K/sec) | 1,200 | 1,470 | 865 | 1,140 | 864 | 1,360 | 781 |
| 3D WinMark | 856 | 729 | 927 | 466 | 751 | Did not run | 755 |
| 3D quality tests | | | | | | | |
| Flat shading/ Gouraud shading | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | | ✓/✓ |
| Dithering/Z-buffer | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | | ✓/✓ |
| Perspective correct textures | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ |
| Nearest/linear | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | | ✓/✓ |
| Nearest mipmap nearest/linear | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | | ✓/✓ |
| Linear mipmap nearest/linear | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | | ✓/✓ |
| Mipmap LOD bias | Ø | Ø | ✓ | Ø | Ø | | ✓ |
| Modulate/decals texture blending | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | | ✓/✓ |
| DecalAlpha/ ModulateAlpha texture blending | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | | ✓/✓ |
| Flat wrap texture addressing | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ |
| Cylindrical wrap u/wrap v | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | | ✓/✓ |
| Clamp/mirror texture addressing | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | | ✓/✓ |
| Cull counterclockwise/ cull clockwise | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | | ✓/✓ |
| Cull cone | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ |
| Fog vertex linear/ fog table linear | ✓/Ø | ✓/Ø | Ø/Ø | ✓/Ø | ✓/Ø | | ✓/✓ |
| Fog table exponential/ specular highlights | Ø/✓ | Ø/✓ | ✓/✓ | Ø/✓ | Ø/✓ | | ✓/✓ |
| Colour key/alpha transparency | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | | ✓/✓ |
| Source alpha/add pixel blending | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | | ✓/✓ |
| Modulate pixel/ 2x pixel blending | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | | ✓/✓ |
| Alpha vertices/ perspective correct alpha | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | | ✓/✓ |
| Alpha comparison greater than/greater than or equal | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | | ✓/✓ |
| Alpha comparison less than/less than or equal | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | | ✓/✓ |
| Z comparison greater than/ greater or equal | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | | ✓/✓ |
| Z comparison less than/ less than or equal | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | | ✓/✓ |
| Z accuracy/bias | ✓/✗ | ✓/✗ | ✓/✗ | ✓/✗ | ✓/✗ | | ✓/✗ |
| Anti-aliasing 640 by 480/ triangle rasterisation | ✓/✓ | ✓/✓ | ✗/✓ | ✓/✓ | ✓/✓ | | ✗/✓ |
| Texture fidelity/swapping | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | | ✓/✓ |
| High triangle count | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ |
| Fog vertex and color key | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ |
| Fog vertex and alpha | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ |
| Alpha and linear | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ |
| Alpha and linear mipmap linear | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ |
| Small triangles | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ |
| Perspective correct color/ specular | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | ✓/✓ | | ✓/✓ |
| Anti-aliasing 1024 by 768 | ✓ | ✓ | ✗ | ✓ | ✓ | | ✗ |

1. The products used in these tests are the shipping versions available to the public at the time of publication unless otherwise stated.

2. Winstone, WinBench and associated products are registered trademarks of the Ziif-Davis Publishing Company.

3. These tests were performed without independent verification by Ziif-Davis Publishing Company.



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| APC (12 issues) & Corporate IT (12 issues) | \$100 | PCU (12 issues) & CD Week (24 issues) | \$84 |
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| PCU (12 issues) & Corporate IT (12 issues) | \$100 | | |



TUNING

A great way to get free entertainment on your PC is with a TV tuner card. APC Labs tests 11 products that offer this accessible desktop option.

BY STEPHEN WITHERS





The idea of a TV tuner card is an attractive one. You already have a monitor on your desk, so why not use one corner of the screen to keep an eye on the cricket?

TV tuner cards promise to make this dream happen. They allow you to watch any free-to-air channel simply by installing an add-on card, plugging in an antenna and using the supplied software. PC TV is certainly better than the low-quality services offered via streaming multimedia online and it's free too.

These cards also typically have video inputs, so you can use them as low-end digitisers for videoconferencing or for capturing home video clips for your Web site. For this review, we tested 11 of the latest models.

One key point to note is that you're unlikely to match the performance of a conventional TV. You will need an external (rooftop) antenna — or even better, cable television — just to get decent reception. Only a few vendors specify this, but unless you are located in a strong signal area, an indoor antenna won't cut it.

We used an external antenna during testing, swapping the cable between the PC and a TV to compare picture quality. Generally speaking, the picture quality in a window, which is

ideal for viewing while carrying out other tasks, was as good as the TV; full-screen display was inferior. Audio quality was not obviously different among any of the cards and gave us no cause for criticism.

Most of the cards we tested had very similar specifications, including a Brooktree decoder chip and often a Temic or Philips tuner module. Not surprisingly, the performance was also very similar. Your own choice may come down to extra features, such as the remote control and FM radio tuners offered on certain models, or price. The most distinctive product among those tested was the Tekram CaptureTV, which combines a VGA adapter and a TV tuner on one card.

More differences can be found in the viewing software, although the variations tend to be in the user interface, rather than the supported features. There were also some features in common, such as the use of Cebra videotext software by multiple vendors.

Hardware installation for TV tuners is generally straightforward: open the PC, fit the card into a free PCI slot, close the case and connect the cables. There's not much else to it, although many cards reviewed sported a large number of cables. Some of the tuners included a short cable to connect the audio output from the card to the audio input on the soundcard. A few also offer an internal passthrough connection, placing the tuner between the CD-ROM and the soundcard. This is neater (and leaves the external audio socket free), but you'll generally have to provide your own cable and cope with minimal documentation. Software installation is also generally a simple, two-step process: installing drivers (Plug and Play generally made this easy) then the viewing application.



How we tested

All the cards were tested in a Compaq Deskpro with a Matrox Millennium G200 AGP graphics card, running Windows 98. Some of the vendors have identified various compatibility problems with certain cards, so we recommend you check your video card's requirements before purchase.

Picture quality is subjective. It was judged by comparing the image on the PC with a TV connected to the same antenna. Reception was always better on certain channels than others, which ensured consistent results.

Still image capture was tested using the software's default setting in every case. Some of the captured images are included in this article, but the quality of these images does not necessarily reflect the overall picture quality. Variations occurred due to weather and other conditions beyond our control throughout the period in

which screen captures were taken. Our comments on quality describe the picture relative to that obtained at practically the same time on the TV.

The same principle of using default settings was applied to video capture, except where the results were obviously substandard (such as a card that dropped over 80% of the frames). The object was to find the largest image size (usually captured at 15 frames per second) that yielded acceptably smooth replay.

Unless noted, we only tested the software packaged with the products. In a couple of cases, we ran into difficulties that required us to download new software from the vendors' Web sites.

apcmag.labs

What we didn't test

There are a number of TV tuner products on the market which we didn't test for this review, either because they were unavailable or because they didn't differ significantly from products we did test.

- The miroVideo PCTV Pro is basically the same as the PCTV, but it features an FM radio tuner and a stereo TV decoder.
- Vision Beyond 2020 told us the AiTech WaveWatcher was being discontinued and was therefore unavailable for testing.
- A new card from LifeView was expected, but did not arrive by the time testing was completed.
- A similar story applied to a new ATI card, which didn't reach BBF Components in time for our tests.
- Chips and Bits was invited to submit products, but chose not to do so.
- Edge was also invited to participate, but did not respond to phone or written requests.

MagicTVView

DYNALINK

The MagicTVView was one of the two best cards in terms of picture quality. The other was Pinnacle's miroVideo PCTV (see review, page 135). One minor problem was the appearance of a black margin at the left and top edges of the picture, but we were able to fix this by toggling the TV Frame setting. (This feature puts a 'picture frame' around the image.)

The remote control sensor is small, beige (to match most PCs), and includes a self-adhesive pad to fix it to a suitable surface. The audio cable has RCA sockets for connection to an external amplifier.

Tuning is easy. We simply selected Australia from the country menu and we were able to view all five stations, though they were not associated with their natural channel numbers — to watch Channel 9 for instance, we had to select 8. Finetuning is possible, but unnecessary.

The software has a convenient interface including a multichannel preview, despite a Windows 3.1 look in some places. Clicking the right mouse button to select still or movie capture is handy. The latter worked well at up to 192 by 144 pixels, but at 384 by 288 the picture was jerky.

■ **Distributor** Hallmark
■ **Phone** (03) 9540 8555

■ **Online** <http://www.hallmark.com.au/>
■ **Price** \$155
■ **In short** Excellent value for money, but the software could be improved.

Video Wonder/Pro II V2

GENIUS

The printed circuit board for the Video Wonder Pro is identical to that of the LifeView FlyVideo (see page 134). It comes with the same remote control, but its audio output and cable are colour-coded to reduce confusion with the audio input socket. The software is also very similar to that included with the LifeView cards.

The Video Wonder/Pro arrived too late to be reviewed as extensively as some of the other products, but in the limited time we had to test, its performance was equivalent to the FlyVideo. The main differences are that it does not tune channels to their natural numbers and it does not support teletext.

■ **Distributor** BBF Components and Peripherals
■ **Phone** (03) 9761 4299
■ **Online** <http://www.bbf.com.au/>
■ **Price** \$189
■ **In short** Virtually the same as the FlyVideo TV, but more expensive.



WinTV-primio

HAUPPAGE

WinTV-primio creates a good first impression; the installer reports whether the drivers have loaded successfully and it checks your video card. Unfortunately, the software doesn't support the included remote control, so we had to update the software from Hauppauge's Web site. Along with the infrared installer (hidden under Accessories) we also downloaded new drivers and applications. This broke the teletext software, requiring an update which is not referenced from the same page.

After all this, tuning was easy, with automatic channel scanning and simple finetuning (if needed). The remote control receiver is a fairly large, freestanding device.

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An LED comes on when it detects the controller is in use and offers useful feedback.

The user interface echoes traditional Windows conventions, which some people would prefer to a simulation of a VCR or set-top box.

A handy feature is that it memorises separate sizes and positions for the regular and bare (no frame, no controls) windows, and a right-click toggles between them. This is ideal for monitoring a program in a small window in the corner of the screen, then enlarging it when something interesting happens.

Video capture was fine at 160 by 120 pixels, and not too bad at 320 by 240.

The teletext software caches pages, making for quick response to selections. It is also scriptable, though we did not explore this feature.

- **Distributor** New Magic
- **Phone** (03) 9885 5888
- **Online** <http://www.newmagic.com.au/>
- **Price** \$219
- **In short** Useful teletext features add to a neat package.

WinTV-radio

HAUPPAGE

All of our observations about the WinTV-primio apply to WinTV-radio, as it is essentially the same product with the addition of an FM tuner.

The radio software interface looks like a car radio interface and has a provision for 30 preset channels. You can either scan for stations or manually tune up or down (either through the software or with the remote controller), but there is no provision for fast tuning either by entering a frequency or dragging a slider control.



Onscreen buttons make it quick and easy to switch from radio to TV or audio CD.

- **Distributor** New Magic
- **Phone** (03) 9885 5888
- **Online** <http://www.newmagic.com.au/>
- **Price** \$349
- **In short** A substantial premium to pay for radio reception and stereo TV.

TurboTV

INTEGRATED MICRO SOLUTIONS

TurboTV is the only card we found that supports both Mac OS and Windows. The distributor does not provide technical support for Windows users, but it is available online from the manufacturer.

The Windows software supplied in the box would not install properly, so we downloaded a completely new version from <http://www.ixmicro.com/>. This did work, but was not particularly impressive. The software bundle also includes Asymetrix Digital Video Producer and Digerati MovieClips.

The picture quality was up with the pace, apart from the presence of a broad 'noise' stripe immediately to the right of the image. The control bar uses icons that we didn't find immediately obvious. The preferences dialog insisted on opening with its lower edge tucked under the Start bar and the software was less stable than the others.

On the positive side, individual channels can be locked so they can't be selected

without a password, 'commercial skip' gives you 30 seconds on another channel, and replacing the desktop pattern with live video is fun, if a little distracting. You can also schedule dates and times for the software to come to the foreground, minimise or begin video capture.

Still images can be grabbed easily at different sizes, and video capture was good at 192 by 144 pixels, but not at 384 by 288.

- **Distributor** Macsimise
- **Phone** (03) 9521 4877
- **Online** <http://www.macsimise.com.au/>
- **Price** \$200
- **In short** Kudos for Mac support, but the Windows software still needs some work.

FlyVideo TV

LIFEVIEW

One of the cheapest cards we tested, the FlyVideo produced a TV picture that was as good as most others, but showed a few rough edges.

Although the connectors are labelled, the Audio socket is shown as 'SPK' in the instruction sheet (which was among the worst documentation in this category). When you run the software the first time, you're asked if the video appears smoothly before you've had a chance to set a station. If you answer 'no', the software tries progressively smaller image sizes. As far as we could see, the only way to reset the maximum size was to reinstall the software.

Once you're up and running, things improve. Stations automatically come up on their natural numbers and FlyVideo picked up several UHF repeaters. The 25-image station preview is handy for the serious channel surfer — click a still and the picture goes live, double-click to toggle

| Product | Dynalink MagicTVView | Genius Video Wonder/Pro II V2 | Hauppauge WinTV-primio | Hauppauge WinTV-radio | Integrated Micro Solutions TurboTV |
|----------------------------|---|---|---|---|---|
| Distributor | Hallmark | BBF | New Magic | New Magic | Macsimise |
| Phone | (03) 9540 8555 | (03) 9761 4299 | (03) 9885 5888 | (03) 9885 5888 | (03) 9521 4877 |
| Online | http://www.hallmark.com.au/ | http://www.bbf.com.au/ | http://www.newmagic.com.au/ | http://www.newmagic.com.au/ | http://www.macsimise.com.au/ |
| Price | \$155 | \$189 | \$219 | \$349 | \$200 |
| Composite video-in | Y | Y | Y | Y | Y |
| S-Video-in | Y | Y | Y | Y | Y |
| Internal audio passthrough | N | N | Y | Y | Y* |
| Radio | N | N | N | Y | N |
| Remote control | Y | Y | Y | Y | N |
| Teletext | Y | N | Y | Y | N |
| Documentation | Fair | Fair to good | Good | Fair | Fair |

* (Mac cables included)

between the preview and full screen display. A control bar along the bottom of the screen is ugly and not especially convenient.

The teletext software — a separate application — caches pages for quick access, and VideoLive Mail provides for the exchange of video clips (asynchronous videoconferencing, if you like).

Still capture worked well, video capture was excellent at 160 by 120 pixels and only just fell short of what's needed at 320 by 240.

| | |
|----------------------|--|
| ■ Distributor | Vision Beyond 2020 |
| ■ Phone | (03) 9558 0333 |
| ■ Online | http://www.bc.com.au/ |
| ■ Price | \$149 |
| ■ In short | Another good value package, providing the user interface doesn't bother you. |

FlyVideo TV FMR

LIFEVIEW

This product is a variant of the FlyVideo TV; it has an added FM radio tuner and the convenience of remote control. The audio label mismatch has been fixed and the FM antenna input replaces the S-Video socket.

The radio software interface is styled like a car radio and is generally easy to use. That's good, as the help facility is not always helpful.

The remote control sensor is small and would need a blob of Blu-Tac or similar to hold it in place. The remote itself provides the normal TV and radio functions, plus mouse control including left and right buttons. You need to be light-fingered, otherwise you'll find you've moved up two channels instead of one.

| | |
|----------------------|---|
| ■ Distributor | Vision Beyond 2020 |
| ■ Phone | (03) 9558 0333 |
| ■ Online | http://www.bc.com.au/ |

- **Price**
- **In short**

\$199

An extra \$50 isn't much to pay for the radio and remote control.

miroVideo PCTV

PINNACLE

The PCTV was our equal favourite in terms of picture quality, alongside the Magic-TVView, but the difference wasn't enough to justify the leap in price. It did excel in its ability to smoothly capture video at 320 by 240 pixels and 15 frames per second, though this is done by an auxiliary program, not the main application.

Setup was as simple as for the others, with automatic TV tuning and no need to finetune. Unfortunately, it doesn't map channels to their natural numbers.

The software makes good use of the right mouse button and includes the option of a 16:9 ('widescreen') aspect ratio as well as the usual 4:3. The package includes Liquid Pics, an image manipulation program similar in concept to the well-known Kai's Power Goo. Teletext is supported by a separate application. While it conveniently opens pages in new windows, it does not buffer, so you often have to wait for a page to be retransmitted.

The miroVideo PCTV really needs a better manual and help index. The help index includes German terms, which is a little confusing.

| | |
|----------------------|---|
| ■ Distributor | Lako Vision |
| ■ Phone | (03) 9852 7444 |
| ■ Online | http://www.lakovision.com.au/ |
| ■ Price | \$269 |
| ■ In short | The top performer when video capture rates are important. |

PlayTVpro

PIXELVIEW

This card departs from common practice by reducing the number of connectors on the back panel with an 'octopus' cable for the remote control, composite video, S-Video and audio inputs. Despite that, the FM antenna connection is positioned in a way that its adapter plug has to be pulled out before the card can be installed or removed.

The software installer was a little quirky, requiring more navigation to reach the drivers, but providing drivers for a variety of hardware. There is no option to install the English version of DirectX.

Once everything was running, the software automatically tuned the stations, including UHF repeaters, but not SBS or Channel 31. Picture quality was par for



the course. The channel preview (16 images) is useful, but it displayed several non-existent UHF channels, giving a high proportion of blank images.

In terms of overall look and feel, the PlayTVpro's TV and radio software was among our favourites (and was consistent across TV and radio). It includes VideoLive Mail. The receiver is a flat, off-white, free-

| LifeView FlyVideo TV | LifeView FlyVideo TV FMR | Pinnacle miroVideo PCTV | PixelView PlayTVpro | Spirit TV/Video Card | Tekram CaptureTV M250 |
|---|---|---|---|---|---|
| Vision Beyond 2020 | Vision Beyond 2020 | Lako Vision | Digicor | Mike Boorne Electronics | Lan 1 |
| (03) 9558 0333 | (03) 9558 0333 | (03) 9852 7444 | (03) 9560 7222 | (02) 9906 6666 | (02) 9319 6411 |
| http://www.bc.com.au/ | http://www.bc.com.au/ | http://www.lakovision.com.au/ | http://www.spiritmodems.com.au/ | http://www.digicor.com.au/ | http://www.lan1.com.au/ |
| \$149 | \$199 | \$269 | \$182 | \$149 | \$249 |
| Y | Y | Y | Y | Y | Y |
| Y | N | Y | Y | Y | Y |
| N | N | Y | | Y | Y |
| N | Y | N | Y | N | N |
| N | Y | N | Y | N | Y |
| Y | Y | Y | Y | N | N |
| Poor | Poor | Fair | Fair to good | Poor | Fair to good |

standing unit. Unlike the other products, batteries for the remote are not included. Although the manual appears good at first glance, it doesn't cover the radio functions.

Movie capture didn't quite make the grade at 320 by 240 pixels, but was good at smaller sizes. A pop-up menu for still and movie captures is convenient.

| | |
|---------------|---|
| ■ Distributor | Digicor |
| ■ Phone | (03) 9560 7222 |
| ■ Online | http://www.digicor.com.au/ |
| ■ Price | \$182 |
| ■ In short | A good balance of price and features. |

TV/Video Card

SPIRIT

The TV/Video Card did a good job of automatically tuning stations, although it was the cheapest card reviewed, alongside the FlyVideo TV. It even managed to find SBS and Channel 31 (though on repeaters, not



their usual channels). The picture quality was slightly poorer than some of the other cards, but the difference was marginal. One definite problem was that the colour sometimes disappeared from the picture. We fixed this by toggling between the PAL-B and PAL-N video settings.

The software is basic and supplied on a single floppy rather than on CD-ROM, unlike all the others' software. The user interface resembles a TV front panel and a remote control, but not all the buttons and sliders are labelled. (The unlabelled buttons on the TV are the volume controls and the anonymous sliders are for volume and balance.)

Video capture was good at 192 by 144 pixels, but not at 384 by 288. The manual was good but limited. Some diagrams and information about using the software would be useful.

| | |
|---------------|---|
| ■ Distributor | Mike Boorne Electronics |
| ■ Phone | (02) 9906 6666 |
| ■ Online | http://www.spiritmodems.com.au/ |
| ■ Price | \$149 |
| ■ In short | Cheap, but lacks features and polish. |

CaptureTV M250

TEKRAM

Unlike every other product in this test, the CaptureTV integrates a VGA adapter (with an ATI Rage controller) and a TV tuner on a single card.

Apart from that, it's not outstanding. It keeps up with the pack in terms of picture and sound quality, but the software isn't especially friendly. Automatic channel scanning is slow (it picked up the UHF repeaters, but not Channel 31), manual tuning is fiddly, and you have to switch modes to capture movies. It has an old-style interface, and the software uses short filenames.

Its good features include channel locking, video desktop, and scheduled events (watch TV, play a file, or close the player software at specified times and dates). Like the miroVideo PCTV, the M250 produced



EDITOR'S CHOICE

PixelView PlayTVpro

The overall similarity between the products tested for this review made it difficult to select one as Editor's Choice.

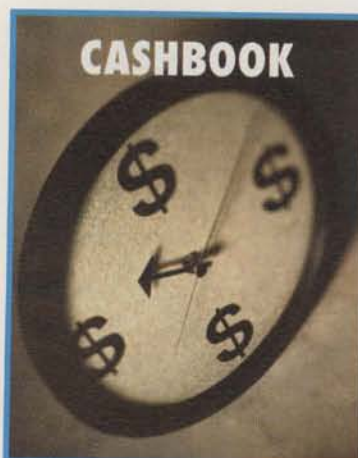
The PixelView PlayTVpro gets the guernsey due to its pleasant user interface, good performance and excellent feature set, all for a modest price. It would be even better if the installation of its software was more streamlined.

Integrated Micro Solutions deserves praise for providing PC and Mac drivers as well as video-editing software in its TurboTV package. However, the current state of the main Windows software lets the card down. If you're not in a hurry to buy, this is the card to watch as its software matures.

smooth-running 320 by 240 pixel movies, but still captures defaulted to 256 colours.

The remote control has no special features apart from a vague reference to support for system power control where supported by the computer itself. The free-standing receiver was more convenient than the 'button' designs included with some other cards.

| | |
|---------------|--|
| ■ Distributor | Lan 1 |
| ■ Phone | (02) 9319 6411 |
| ■ Online | http://www.lan1.com.au/ |
| ■ Price | \$249 |
| ■ In short | If you need a graphics adapter and a TV card, this approach saves money. |



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Workshop

137 APC Magazine

CONTENTS

Welcome to Workshop, the section dedicated to bringing you all manner of tips, interesting information and do-it-yourself tutorials. Within these pages you will find useful shareware, informative operating system-specific columns and in-depth programming tutorials.

All files mentioned in Workshop can be found on **apcmag.cd** or downloaded from our Web site at <http://apcmag.com/>. You can join one of our online discussion forums to discuss technical issues or just voice your opinion on any related topic.

Workshop is a reader-input section. Please send us your ideas, comments or criticisms via email to workshop@acp.com.au, or snail mail to APC Workshop, 102 Toorak Road, South Yarra, Victoria 3141.

A full archive of Workshop articles can be found online at <http://apcmag.com/workshop>.

Stephen Withers, Workshop editor



Bug of the Month

In the absence of a suitable winner for this month, I'm going to award the Bug of the Month (but no prize) to a Canadian Software company called Zero-Knowledge (<http://www.zeroknowledge.com/>).

You've probably heard about the Pentium III serial number, which is either going to solve all our online problems or put an end to privacy as we know it, depending on whom you ask. In the face of a huge backlash, Intel released some software to turn off the serial number to protect your privacy. Zero-Knowledge has produced some ActiveX code to bypass Intel's safeguards and obtain the Pentium III serial number. Intel has, of course, reacted in its usual relaxed manner — and reported the code to Symantec as a virus. Symantec's Norton AntiVirus software now reacts accordingly when it encounters the code.

Don't you love politics?

Tech Talk 138

Technobabble explains how still and moving pictures are compressed, while Step by Step offers some tips on buying second-hand computer hardware.

Operating Systems 147

Windows 98 shows you how to use Microsoft Personal Web Server; OS/2 explains how to install system software over a network; Mac OS explores Mac OS X Server; and Linux presents the Gnome desktop environment.

Programming 157

C++ explains the sometimes-confusing topic of pointers, while Java looks at using scope to simplify debugging.

Please note that owing to space restrictions, Shareware Summary does not feature in this month's print edition. You can still find the latest shareware reviewed in the Workshop section of this month's **apcmag.cd**.

Win! Win! Win!

Workshop is always on the lookout for the most interesting, strange, funny or downright weird software bugs you can find. These include code snippets, examples of features that function poorly, or procedures for crashing a particular application. Anything and everything that is buggy deserves mention.

Send us your favourite bug via email to bugs@acp.com.au or snail mail, and you'll be in the running to win a software prize. Please send screen captures, example code listings or detailed instructions to trigger a bug in an application, as appropriate for your entry.

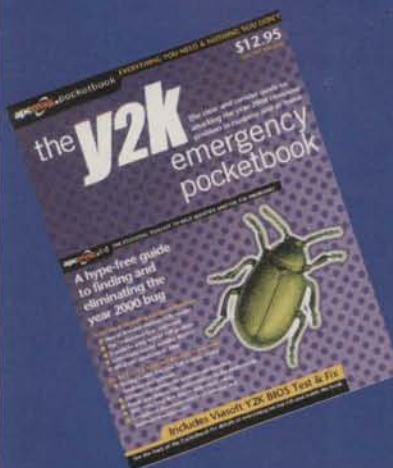
The winner's name, along with details of the bug, will appear in the Bug of the Month column in the September edition of APC. Rush those entries in so we can give away some software next month!

Michael Smith

Pocketbooks

If you're a home user or small business owner, you still have time to attack Y2K before it attacks you. The Y2K Emergency Pocketbook offers you a complete toolkit to test, identify and fix Y2K problems.

On sale now at newsagencies everywhere, or order direct from <http://apcmag.com/shop/>.



The response to the Pocketbook series so far has been phenomenal, and we're excited about the latest in the series, the Y2K Emergency Pocketbook and the Networking Pocketbook, both of which are currently available.

We've also had many emails and phone calls asking if we're going to release a new version of the Linux Pocketbook with Red Hat 6.0 on the cover. The answer is yes, and the Revised Edition Linux Pocketbook is in production as we speak. Look out for it soon!

If there is a specific topic or subject you'd like to see covered in Pocketbook format, please email amills@acp.com.au.

apcmag.pocketbook

The inner workings of two key multimedia compression systems: MPEG and JPEG. By Nathan Taylor

Technobabble

JPEG and MPEG have quickly become two of the most important developments for the Web and digital television. There are other standards for the compression of images and video, but none are as likely to play as much of a part in our multimedia future as JPEG and MPEG. The workings of these two open standards are very complicated, but the end result is massive bandwidth savings for users and developers.

This month we take a look at how they both work, what they're capable of doing, and the trade-offs involved. A word of warning: if you're not mathematically inclined, you may have trouble understanding how compression works.

JPEG

The Joint Photographic Experts Group's standard for image compression has quickly become the standard for publishing on the Web. Its massive compression ratio makes it ideal for bandwidth-limited connections, and its structure makes it possible for users to determine the trade-off between image quality and file size.

It's important to remember that JPEG is known as a *lossy* algorithm. Each time an image is converted to a JPEG format, some of the original information is lost. The more times an image is edited and re-saved, the more information is lost (see right). There is one exception: lossless JPEG can compress images without losing any detail, but the compression level is so low that few people actually use it.

There is also a video codec known as M-JPEG (Motion JPEG). It is not an official standard, but video-editing products commonly use M-JPEG rather than standardised video codecs such as MPEG. M-JPEG makes editing easier because each frame in an M-JPEG stream is an individual JPEG image which is not connected to the other frames. MPEG is difficult to edit because the frames often represent changes from previous frames.

MPEG

MPEG-1 was first standardised in 1991 as a means for showing VHS-quality video over low-bandwidth connections. MPEG-2, a backward-compatible superset of MPEG-1,

was introduced later. Today MPEG-2 is the key component in DVD-video and in future digital television standards.

MPEG-2 is a big step up from MPEG-1 and incorporates a number of advancements, the most important of which is a

JPEG image compression

One of the first stages in compressing a JPEG image is *colour space conversion*. Normal images are stored with data in three channels: red, green and blue (RGB). Colour space conversion converts the RGB channels into the YUV or YCbCr colour space. Instead of a colour being determined by the red, green and blue channels, colours are broken into a luminance channel (Y) and two chrominance, or hue, channels (U and V).

There's a good reason for this: the human eye is better at detecting differences in luminance than those in chrominance. The computer can discard a great deal of the resolution in the chrominance channels with little noticeable effect on the final result. In halving both the vertical and horizontal resolution on the chrominance channels, a process known as *2h2v sampling*, you're effectively immediately halving the data required to store the full JPEG image (as each chrominance channel becomes a quarter of its original size). Sometimes only the horizontal resolution is halved; this is called *2h1v sampling*.

Colour space conversion is not really necessary, as the next stage in the compression process, *discrete cosine transformation* (DCT), can deal with any type of channel, be it RGB or YUV. It sounds complicated and it is. For each channel (Y, U and V), the pixels are grouped into eight by eight blocks, and the DCT describes the mean value (often called the DC) in the block. Each pixel in

the block is then converted into a coefficient of that mean value. This produces a table of DCT coefficients that define each channel in the image. This process doesn't save any space, but it does make quantisation possible.

Quantisation is designed to take minimal differences between pixels and discard them. A pixel's coefficient is multiplied by the block's DC and the result is rounded off. The result is that smaller, unnoticeable coefficients disappear. The amount of rounding is determined by the compression level of the JPEG image selected by the user. This is where most of the image quality is lost.

This 'flattening out' of the coefficients makes the image easier to compress with a standard compression system, *Huffman Coding*. Huffman Coding builds a tree based on the frequency of data sequences. So, if the sequence 1 2 3 4 5 appears frequently in the image data, Huffman Coding builds a table saying that 'a' represents the sequence 1 2 3 4 5. Then every time the sequence appears, it replaces it with an 'a'. It's a lot more complicated, because computers only deal in binary numbers (more realistically, the sequence might instead be replaced by '010'), but the principle still applies.

As an additional note, the JPEG standard allows for a slightly more efficient encoding method, called *arithmetic coding*, to be used. Few use it, however, because of the royalty requirements attached to patents on the method.

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JPEG image compression at work

This image, a 1,633 by 2,122 bitmap, has a file size of 10.354M. Compressed using JPEG with minimal compression (a '1' setting in a product like Paint Shop Pro), the image size is reduced to 1.134M, without any perceptible loss in visual quality. Cranked up to the highest setting ('1') it was reduced to just 65K, but looked appalling.

flexible frame size. Technically, MPEG-2 frames can be as large as 16,383 by 16,383 — although no current technology has anywhere near the processing power required to drive such a resolution. There are a number of standard resolutions, but Australian (and European) resolutions differ from US resolutions, primarily because of our different television standards. The US adheres to the National Television System Committee (NTSC) colour broadcast standard, whereas Australia and most of Europe use Phase Alternating Line (PAL).

Most MPEG-1 video is delivered in a 352 by 240 resolution frame at 30 frames per second, although technically this is based on the NTSC standard. In Australia and Europe, the MPEG-1 standard officially has 288 horizontal lines, rather than 240, and runs at 25 frames per second. A similar rule applies to MPEG-2 video; the standard frame sizes differ between the US and Europe and Australia.

MPEG also has to deal with audio. MPEG audio has enjoyed a recent surge in popularity, largely due to its high compression ratios and the quality it can deliver. MP3, which is short for MPEG-1, Audio Layer-3 (not MPEG-3), uses the highest compression possible with MPEG yet still delivers good quality.

Recently, a new standard called MPEG-4 was introduced. MPEG-4 uses a novel approach of dividing a multimedia stream into *audio visual objects* (AVOs), each delivered separately. An AVO could be, for example, an audio stream, a video of a character's head, or a background.

A composition stream to put them all back into place is also part of the standard. It was originally designed to facilitate delivery of multimedia over bandwidth-limited networks (particularly the Internet), and AVOs are prioritised for delivery. For instance, in a videoconferencing MPEG-4 stream, the voice AVO would have higher priority than video AVOs. (For more on MPEG-4, see *APC* November 1998, page 94.)

Yet another standard, MPEG-7 is scheduled to be introduced in 2001. MPEG-7 will introduce a description layer to multimedia for better archiving and searching

capabilities. Under MPEG-7, an image, 3D object, video or audio stream will have details on its contents embedded in the file. Finding an image of your favourite actor on the Web, for instance, could become easier as images will have descriptions of their contents. Trying to find an image with 'Anthony Michael Hall sitting on Opera House steps' in its description layer will be easier than finding the image based on filenames.

Next month we put your new-found MPEG knowledge to good use when we look at digital television.

MPEG video encoding

MPEG has a lot in common with JPEG for intra-frame compression. Individual frames are compressed by many of the same methods used in JPEG, but MPEG goes several steps further. It provides the means to remove redundancies *between* frames, as well as providing an audio codec. Collectively, they can provide compression ratios of up to 180:1 on video streams.

There are three components to an MPEG stream: an audio, video and synchronisation stream.

In addition to intra-frame compression, MPEG uses a system known as key frame compression. The contents of frames are predicated on the contents of previous frames. There are three types of frames: 'I', or intra frames, which are self-contained images (you have to start somewhere); 'P', or predicted, frames which are predicted from the previous I or P frame — they contain the differences between the last and current frames; and finally 'B', or bi-directional frames. The latter are predicted from either the next and previous I or P frames, whichever is the closest match. It's quite complicated, but typically you end up with a sequence like IBBPBBPBBPBI.

Audio codec is where the real action is right now, given the recent success of MPEG-1 Audio Layer-3, otherwise known as MP3. MPEG has three audio layers, each with progressively greater compression ratios, but there is greater loss in fidelity and processing requirements. Both MPEG-1 and MPEG-2 use these layers.

Like video, which uses psychovisual models to remove imperceptible data, MPEG audio uses psychoacoustic models

to remove imperceptible sound data. It is modelled on human hearing traits, dividing the audible spectrum into 32 bands based on frequency (pitch). When sounds from one band mask sounds of another, the details in the masked band can be discarded. For instance, if a song has a loud boom from a drum completely drowning out the sound of a bass guitar playing in the background, then the data required to make the guitar sound would be removed.

Quantisation can also be applied to the sound, so slight changes in pitch and amplitude can be 'flattened out' to better aid the compression process. Thus MPEG audio is scalable in the same way that JPEG is scalable, varying in bit-rate depending on the user-selected quantisation ratio.

The three audio layers, which are cumulative, differ as follows:

- Layer-1 uses frequency masking and a DCT type filter. Its compression ratio versus a wave file is generally about 4:1.
- Layer-2 adds temporal masking, comparing sound with subsequent and previous audio, similar to video frame comparisons. It compresses at about a 6:1 ratio.
- Layer-3 provides additional stereo redundancy (so if both channels are making the same sound, one data set is removed), and uses Huffman Coding for additional compression. Compression is approximately 12:1.

The final stream, the synchronisation stream, simply ensures the audio and video are timed correctly, so the video doesn't look like a badly dubbed foreign language film.

AUSTRALIA

Internet



World 99



E-business visionaries to speak at Internet World 99

Gene DeRose and Jeremy Allaire, two internationally recognised global visionaries of the e-business future, will lead a team of more than 100 local and overseas experts who will conduct forums, "hands-on" workshops and conference sessions at this year's Internet World 99 at Darling Harbour from August 2-4.



GENE DEROSE

DeRose, the often quoted and much published Chairman and CEO of Jupiter Communication — "the second most powerful Internet executive in New York City," according to the influential Silicon Valley Reporter — advises major corporations and global media groups on consumer interactivity, new technologies and mainstream media transformation. He is a regular commentator on CNN and CNBC.

Now into its fifth year, Internet World Australia is one of 27 events held annually around the world. The National Office for the Information Economy (NOIE) has declared Internet World 99 an official Online Australia peak industry event for August.

American organisers Penton Media and their Australian partners, Kirby Network Services claim Internet World is "the largest annual enterprise solutions event in the asia pacific region".

"If you are a CEO or a CFO looking for direction, a senior executive wanting to build an internet infrastructure, a marketing manager exploring online advertising options, or a web designer looking for the latest tools — in fact whatever your business needs, Internet World 99 will deliver practical "hands-on" solutions to your enterprise questions and help turn your Internet strategy into a reality," Mr Peter Reid, director of Kirby Network Services said.

JEREMY ALLAIRE

Widely regarded as one of the Internet's most successful young entrepreneurs, Jeremy Allaire, launched Cold Fusion only three years ago, entirely on the web, with a personal investment of just \$18,000. Today his Allaire Corporation is a hugely successful provider of award winning Internet software and Cold Fusion remains the product of choice among a large percentage of web builders. Like Gene DeRose, Jeremy Allaire is widely regarded as an industry visionary and he has developed something of an Internet cult following.

Other Keynote speakers include Kevin Lynch, Vice President, Macromedia and Terry Cutler, Managing Director, Cutler & Co.

Kirby Network Services expects 15,000 plus business-only professionals and decision makers to view the exhibition over the three days, and more than 1000 delegates to attend the three days of workshops and forums which include:

- Electronic Commerce.
- Web Marketing & Advertising.
- Travel On Line.
- Investing On Line.
- Government.
- IP Telephony.
- Consumer On Line.

"This year we will introduce a new event, FutureNet — for the ISPs, Telcos, engineers, IT managers, network managers, covering Linux, virtual private networks, layer switching, and networks of tomorrow." Peter Reid said.

"In August, Internet World 99 will also become the focus for the entire regional Internet development community with the announcement that Macromedia's three-day regional user conference ASIA UCON 99 will be incorporated into Internet World for the first time. ASIA UCON 99 will feature Flash, Dreamweaver and Fireworks developers workshops — and a sneak preview of the very latest state-of-the-art technologies."

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A how-to guide on buying second-hand computer equipment. **By Daniel Rutter**

Step by Step

Second-hand hardware is more likely to cause problems than new gear, but it's a trade-off between privacy and security.

If you're willing to accept this, you can find some excellent deals from private sales, dedicated second-hand technology sellers, general second-hand dealers or auctions. Here is a guide to help you choose wisely.

Whole computers When you're buying a used PC, watch out for computers that use proprietary components. If they are more than a few years old they may be impossible or expensive to fix.

Hard drives Because they are highly sensitive equipment, purchasing a second-hand hard drive can be risky. Drive prices have dropped dramatically in recent years, reducing the appeal of this option. However, if you want a low-capacity drive, buying used equipment may be your best bet — but be prepared for the worst.

Keyboards It's a good idea to have a spare keyboard or two, and I've picked them up second-hand for about \$5 each. Old heavyweight business keyboards will need an adapter to plug them into the new-style PS/2 keyboard connectors. But a good business keyboard will probably outlast the rest of your computer, regardless of its years of previous use. It also feels better than a new \$30 keyboard. This article was written on just such a keyboard. It's hard to tell whether a second-hand keyboard has much life left in it, so when you find some cheap buy a few.

Mice A second-hand mouse is not likely to be as satisfactory as a second-hand keyboard. The plastic rollers in most mice can only take so much scraping from screwdrivers and nail files as people de-crud them before they become unacceptably uneven. Again, the price is likely to be so low that this doesn't matter too much — even a dodgy mouse is good as an emergency backup. Again, \$5 each is a common price. I've seen quite young examples of the Microsoft IntelliMouse in as-new condition for \$10 each.

Cards, RAM and motherboards Any kind of computer circuit board may look fine but actually be broken. Buying cards, RAM or motherboards off the shelf is a big gamble. Even a reputable dealer may

not have checked all of those old 8M SIMMs and they may or may not give you an exchange or refund if the couple you buy for your 486 turn out to be duds.

Gear that's new-in-the-box will probably work just fine, but if it doesn't, you may have a hard time persuading the dealer you didn't static-zap it yourself.

Monitors A decent-size monitor is the most expensive single component of most PCs. Fortunately monitors, unlike every other major PC component, hold their value quite well. A five-year-old CPU or hard drive is likely to be worth very little, but a five-year-old monitor could still be good value at maybe a third of the new price of a similar screen. Real bargain monitors aren't too thick on the ground, but it's common to find one or two-year-old 15 and 17in screens at half the new price.

Second-hand monitors can be a trap. If you find one that seems to be an absolute steal — say an aging 21in screen for \$150 — odds are that it's a 'fixed frequency' monitor, which means it only supports one, or a few, resolution and refresh rate combinations, compared to the range of resolutions and refresh rates supported by current 'multiscan' monitors. It may carry a well-known brand, but it won't work on a plain PC. The simplest way to use a fixed-frequency monitor on a PC is to use a fixed-frequency video card (see <http://www.mirage-mm.com/>).

Just because a monitor has a standard 15-pin connector on its cable doesn't mean it'll work when you plug it into your modern PC. Mind you, just because a monitor has an old-style nine-pin connector, or even three BNC connectors (round coaxial connectors like those on 10Base2 network cards) doesn't mean it won't work; you may just need the right cable or adapter. The specifications for practically every monitor ever made can be found on the manufacturer's Web site. If the manufacturer doesn't list it or doesn't have a site, the screen often turns out to be a re-badge job that's actually made by someone else. A quick Usenet search via Deja.com (formerly Deja News, <http://www.deja.com/>) will tell you which site to check.



Used mice and keyboards are handy spare parts.

Even if a monitor is clearly a PC model, do *not* buy it without seeing it in operation. You can check for scratches and chips on the glass when it's turned off, but there are several other problems that only show up when a monitor is turned on.

Look at a screen that's more or less one solid shade — a plain white page in a word processor, for instance, or the handy solid colours that some monitors display when turned on but not connected to a computer — and check for blotches of colour. These 'purity problems', as they're known, are generally curable with a degaussing wand (any TV repairer will have one), but if the blotches are serious, they can stick.

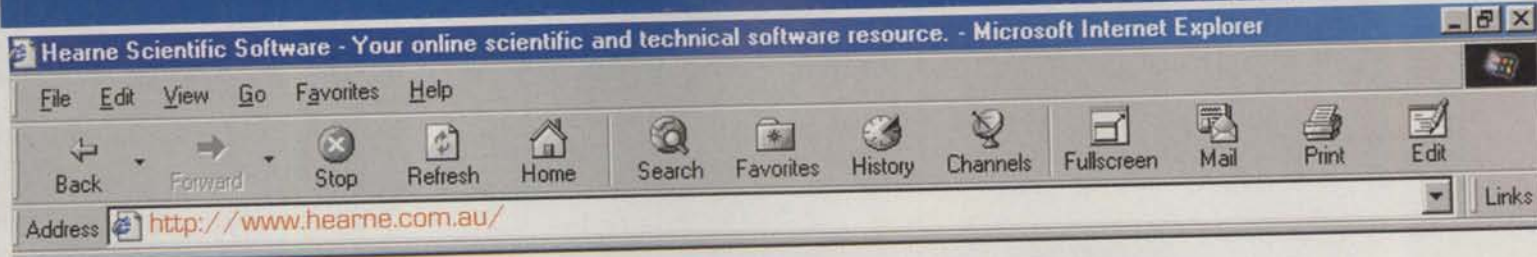
Check for phosphor burn — an image that was shown on the monitor for so long that it's now a permanent ghostly overlay. Modern colour monitors are much more resistant to phosphor burn than old monochrome designs. A monitor that has only had home use should be fine, but business screens that sit for many hours displaying a default menu often show its ghost.

Phosphor burn is incurable, but in mild cases will only be visible against a solid colour, and the monitor will be fine for games or as an emergency standby.

Also check the monitor geometry. Use every control the monitor has and every menu item if it's a recent digital model. Make sure every option, including 'degauss', does something. Some older monitors have lost, for instance, their horizontal-size control and are uneconomical to fix.

Daniel Rutter can be contacted at dan@dansdata.com.

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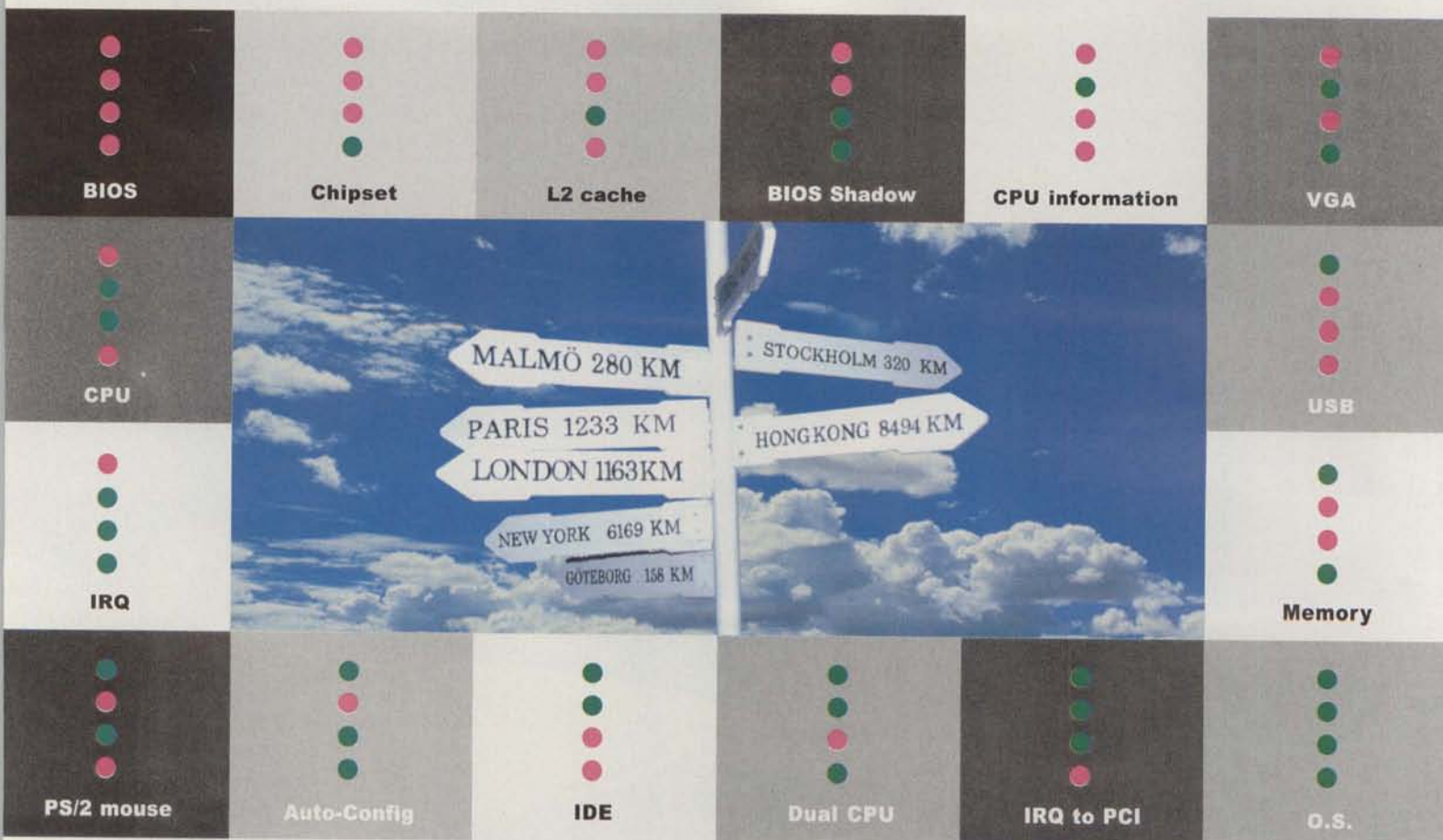
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OPERATING SYSTEMS

Getting to grips with Windows 98's Personal Web Server.

By Kieran McNamee

Windows 98

A personal Web server is a useful application if you are an Internet user. Whether you are the administrator of a huge Web site or an employee who wants to set up a small company intranet, Microsoft Personal Web Server (PWS), a free Web server that runs on Windows 98, is a godsend.

What is PWS?

Basically, PWS allows you to set up a small Web site and keep it running with very little fuss. It can be used to host a Web site on your PC at home or as part of an intranet at work. It can also be used to develop and test a Web site before hosting it with an ISP or to experiment with new techniques and custom server configurations. This is useful for administrators of sites of any size, but sites that generate a lot of traffic would need to be published on a more powerful server.

Running a Web server usually requires a Unix, Linux or Windows NT system. Web servers such as Apache are gradually introducing versions for Windows 98, but they are currently a little unstable. It may not cost anything to install an Apache Web server on a Linux system, but the procedures may be too complex for those accustomed to working in Windows 98.

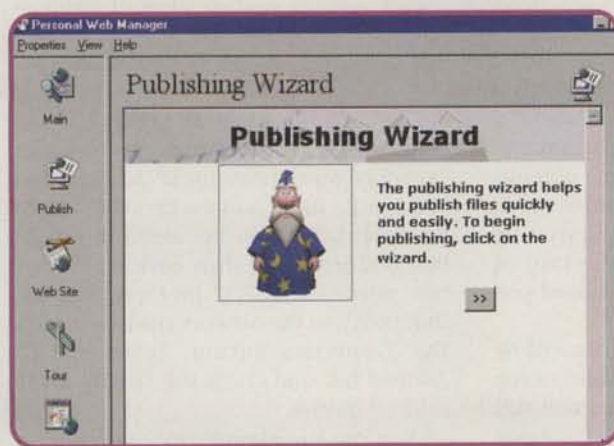
All Web administrators will find PWS useful as there are numerous advantages in using your own server rather than working with your ISP via FTP.

Installing PWS

To install PWS, all you need is a system running Windows 98. A dedicated computer is not required, as it is a very small-scale Web server.

If you have a Windows 98 setup CD, you can find the installation files in the /addons/pws directory. Run SETUP.EXE and follow the directions. Alternatively, install PWS from apcmag.cd.

Familiar Microsoft setup wizards guide you through the installation of the application and before you know it, you will



have the ability to serve HTML pages to the world. After installation, you will have to restart your computer.

The Personal Web Server loads on startup and sits in the system tray. Double-clicking on the system tray icon brings up the Personal Web Manager, which has five sections that help you set up the server and your Web site. The five sections are located on the sidebar and are titled Main, Publish, Web Site, Tour and Advanced.

The Web Site section is the first place you should check out. You do not need any knowledge of HTML to create a home page. Simply provide some information and the Home Page wizard takes care of the rest. Microsoft's Active Server Pages (ASP) can be hosted without having to install NT 4.0 Server or Internet Information Server. If you don't know how to make use of Microsoft's ASP technology, the Home Page wizard will guide you. Along with the framework of your Web site, the wizard can add a guestbook that uses Active Server technology to provide useful feedback from visitors to your site. You can also install additional Active Server Pages provided by Microsoft, by performing a custom setup of the program and selecting the appropriate sub-components.

In the Main section, you can view site traffic statistics such as the number of visitors, requests and bytes served. There are

also direct links to your Web site's home page as well as the home directory in which you place all your files for the Web site.

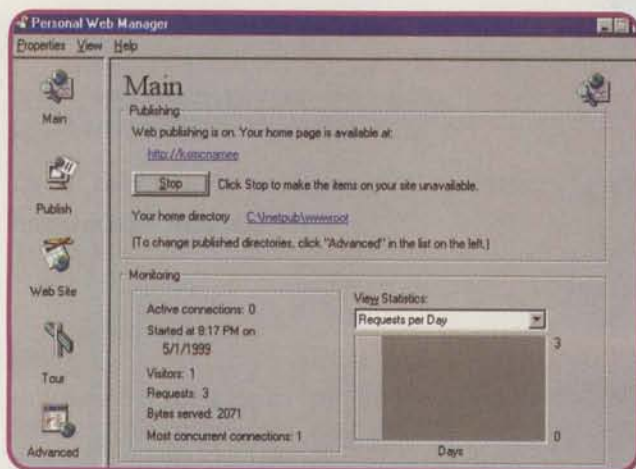
The Publishing Wizard makes it easy for your intranet users to access documents. Follow the directions of the Publishing Wizard and a copy of the document will be placed in the Webpub directory. Then all you have to do is add a descriptive link to the document.

Get the most out of PWS

There is no point in having your own personal Web server if you do not take full advantage of it. Whether you are using the server to disperse information over a small corporate intranet or you are just playing with the technology, there is a lot you can do.

In a networked office environment, there are a few things you have to do before others on the network will be able to access your server. If the LAN you are connected to has access to the Internet, you can use your existing Internet Protocol (IP) address (note this will leave your site open to everyone on the Internet). You will not have a domain name registered for your IP address, so you will have to enter the IP number to access the server. To find out your IP number, simply open the Run box in the Start Menu and type winipcfg.

Instead of having users enter your system's IP address to access the server, you can create a Hosts file so that they can enter a more meaningful domain name instead of the awkward number. The Hosts file is simply a text file with no extension that is placed in the Windows directory. You will find a sample Hosts file named HOSTS.SAM in the Windows directory, which explains how it works. All you have to do is enter your system's IP



address and then assign a domain name next to it (you should make the domain name the same as your computer's Network Neighborhood name). Copy this Hosts file to the Windows directory of every computer on the network, and you are set.

Users who have the Hosts file will be able to enter the specified domain name to access your server, but others will still have to enter the IP number. To have your domain name recognised on the Internet, you have to officially register it.

While on the topic of Hosts files, you can specify your own domain names to point to specific IP addresses on the Web. For instance, instead of typing <http://www.microsoft.com/> in your browser to go to the Microsoft Web site, you

can insert an entry into the Hosts file that associates the two letters 'ms' with the IP address, 207.46.130.14 (which is the address for Microsoft's site). Then all you have to do is enter ms on your browser window to access the Microsoft Web site. To find out the IP address of a particular Web site, open a DOS prompt window and type 'ping domain name', (for example, ping www.microsoft.com).

If your network is not connected to the Internet, your system probably won't have an IP address. You can specify an IP address for your system by right-clicking on the Network Neighborhood icon. You then click on Properties, select the TCP/IP protocol (the one that points to the network card), and click the Properties button. Select the IP Address tab and check the Specify an IP Address button.

You can use almost any combination of numbers for your IP address if you are not connected to the Internet. One number that cannot be used is 127.0.0.1, as this always refers to the local host (your computer). If you don't know what number to set, just use 10.1.1.0 as the IP address. Leave the Subnet Mask setting blank. You can do this for other computers on the network by incrementing the final digit, but this is not necessary for others to access your computer.

Now that your server and Web site are accessible to others on the network, or the Internet, it's time to play with the server and have a look at other technologies supported by it. If you look at the Personal Web Server's help file, you can find out a lot about Microsoft's Transaction Server, Data Access Components and Message Queue Server Client.

The Transaction Server is a component-based transaction-processing system for developing, deploying and managing high-performance, scalable and robust server applications. The Data Access Components provide easy-to-use, programmatic access to all types of data, such as information from SQL,

Access and Oracle databases and others. The Message Queue Server allows applications on a network to communicate with each other, and if they are offline, it stores the message and forwards it later. Not everyone needs features such as these, but if you can make use of them, it is good to know that PWS supports them.

PWS should not be used for critical networking purposes as Windows 98 is not the most powerful or stable system for hosting a Web site. It is great for sharing information among co-workers or friends, but for anything more important you need a dedicated computer running Unix, Linux or Windows NT.

When PWS is not enough

PWS has some limitations and the only way to get around them is to implement a more powerful server application. PWS' major limitations are its 10-user connection limit, its lack of authentication and the requirement that all files published by the server have to be located on the local hard drive.

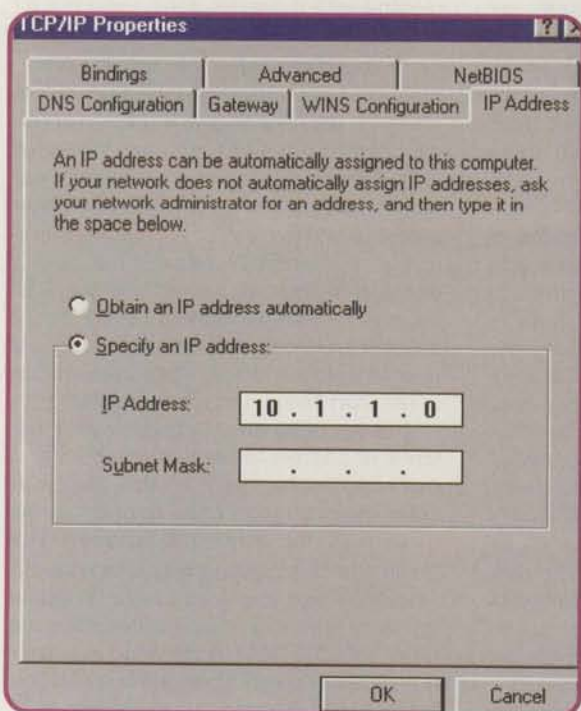
There are no real servers for the Windows 98 operating system, but if you have the resources, you can set up a powerful server on a Unix, Linux or Windows NT system. There are quite a number of servers available and demonstrations of them all can be found on the Web. Three of the major Web servers are Microsoft Internet Information Server (IIS), Netscape FastTrack and Apache.

IIS is built into Windows NT and was designed to deliver the highest level of security for corporate intranets and the Internet. FastTrack also requires Windows NT. It is easy to set up and you can have your pages published within minutes.

Apache is the most widely used Web server. According to the latest Netcraft's survey, (<http://www.netcraft.com/survey/>), Apache is the most popular Web server, hosting 56.19% of surveyed sites. Apache is primarily designed for Unix systems but its latest release, 1.36, runs on Mac OS X Server, Windows 95/98 and Windows NT.

For a complete archive of Windows 98 articles, see apcmag.com/workshop.

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Installing OS/2 over a network explained.

By Christopher Relf

OS/2 Warp

This month we look at the mystery that is OS/2 network installation — do you need to install OS/2 on more than 10 workstations on your LAN? Read on.

CID

CID stands for Configuration, Installation and Distribution, and every version of OS/2 has it. CID makes it easy for system administrators to distribute programs, utilities and operating systems across networks.

What you need to start

First, you need a copy of OS/2 Warp on CD-ROM. Next, you need TCP/IP loaded on a network system (the system needs a CD-ROM drive as well), and three formatted disks. Finally, you definitely need to make sure that you are in compliance with all laws and IBM's terms and conditions regarding installation of OS/2 on a network.

You now need to copy some files from the CD-ROM to a drive on the network server. Copy all of \OS2IMAGE from the OS/2 Warp CD-ROM to the drive you want your users to access — it's probably a good idea to change some permissions now. Just like a CD-ROM, your users will only need read permission, so turn off all write permissions. If you'll be installing all of these versions of OS/2 yourself, you should set the permissions to only allow yourself access. It's *really* important you check that you've copied all of the files from the \OS2IMAGE

directory. If you're using another GUI operating system to do this, use its file manager to quickly compare the sizes of the two directories.

Unpacking your clothes

As you may recall from the time when you installed OS/2 direct from the CD-ROM, you need three floppies to start. This is partly because most workstations don't have a 'boot from CD-ROM drive' option in their respective BIOSes. You need to unpack this information from SEDISK.EXE (this file is often referred to as the 'clothes'). To unpack your clothes, type the following at the OS/2 command prompt:

```
UNPACK Z:\OS2IMAGE\DISK_7\CID\N:
SEDISK.EXE
```

where Z: is your network drive.

If you don't have OS/2 installed, that's OK, just use your normal OS/2 installation disks. When you get the option of going to a command prompt (it's usually associated with an F3 keystroke) you can unpack from there. Once you have unpacked, you need to create the OS/2 network installation disks using the SEDISK .EXE utility:

```
SEDISK /S:Z:\OS2IMAGE /T:A:.
```

Again, Z: is your network drive, and A: is your floppy. You should now label these two disks 'OS/2 Installation Disk' and 'OS/2 Disk #1' respectively; the OS/2 installation will ask for them by name.

Network installation CONFIG.SYS modifications

```
SET SOURCEPATH=Z:\OS2IMAGE
DEVICE=LANMSGDD.OS2 /I: A:\
RUN=LANMSGEX.EXE
DEVICE=PROTMAN.OS2 /I: A:\
DEVICE=IBMTOK.OS2
DEVICE=INET.SYS
DEVICE=IFNDIS.SYS
RUN=INETBIND.EXE
SET ETC=A:\ETC
SET TMP=A:\ETC
TIMESLICE=100,100
RUN=CNTRL.EXE
IFS=NFS200.IFS
SET HOSTNAME=NFSREQ
```

CAB files), you need to add the network drive and path to the CONFIG.SYS file on the OS/2 Installation Disk. For most people, this would mean typing something like:

```
PATH=other stuff goes here;Z:\OS2IMAGE;
```

A few more alterations need to be made to the CONFIG.SYS file, and they are listed in 'Network installation CONFIG.SYS modifications'.

Next, delete SCREEN02.SYS, CLOCK02.SYS, IBM2SDSK.ADD, IBM2FLPY.ADD, IBM2SCSI.ADD and PRINT02.SYS from OS/2 Disk #1. Now that those files are gone (trust me, you won't need them, and they'll knock over your installation if you leave them there), we need to add the files required for the TCP/IP installation. A complete list (with paths) of these files is shown in the side panel 'Network Installation Disk #1 file additions'.

The final step

Now you're ready to go. Insert your OS/2 Installation Disk into the boot floppy drive (usually A:) and switch on your workstation. The installation will access the TCP/IP network, find the network drive where you stored the \OS2IMAGE files, and then use them to complete the install. It really is a great way to install OS/2 Warp Version 4, and a great time saver too.

Need more information? IBM has released a CID guide called *OS/2 Installation Techniques*. ■

Network installation Disk #1 file additions

| Files under the \IBMCOM directory | Files under the \TCP/IP\BIN directory | Other files |
|--------------------------------------|--|-----------------------------|
| LANMSGDD.OS2 | CNTRL.EXE | \IBMCOM\DLL\LANMSGDL.DLL |
| LANMSGEX.OS2 | NFS200.IFS | IBMCOM\PROTOCOL\NETBIND.EXE |
| PROTMAN.OS2 | IFNDIS.SYS | IBMCOM\MACS\IBMTOK.OS2 |
| PROTOCOL.INI | IFCONFIG.EXE | TCP\DLL\RPCDLL.DLL |
| PRO.MSG | INET.EXE | |
| LT2.MSG | ARP.EXE | |
| LT0.MSG | MOUNT.EXE | |
| | NFSCTL.EXE | |
| | NFSBIOD.EXE | |
| | TCP\DLL.DLL | |

Altering your clothes

OS/2 installations differ from workstation to workstation. In order for the installation to see the OS/2 image files (the approximate equivalents of Windows 95's



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Workshop guides you through installing and managing Mac OS X Server and its utilities. By Stephen Withers

Mac OS

Installation

Apple's bold claim that Mac OS X Server goes from "0-serving in 30 minutes" was supported by our install experience. Assistants drive the configuration process and user input is concentrated in two stages, so you don't have to sit and watch.

The first step may be to partition the hard disk. If you are only going to use Apache and/or QuickTime Streaming, you can have a single UFS (Unix File System) volume. If you want these servers to share files with Mac OS clients or if you are going to run AppleShare or NetBoot servers, you'll need an HFS Plus (Mac OS Extended) partition as well. The minimum partition sizes are explained in the installation manual.

Partitioning is carried out in the usual Mac OS manner: restart from the CD-ROM, run Drive Setup, and then set the partition sizes. Once that's done, you can install Mac OS X Server.

When you run the installer, a few mouse-clicks are necessary at the start (for example, to confirm that you accept the licence conditions), but after that you can wander off for about 15 minutes while a minimal Mac OS X Server is installed on the computer and then augments itself with the remaining components such as the AppleShare server and Java. If you do sit through this process, don't be concerned if the computer appears to hang while installing StartupDisk.img.gz; this step does take some time.

When the computer restarts itself for the second time, it runs the Setup Assistant and your input is again required. Most of the questions are self-explanatory and some will be familiar to anyone who has installed Mac OS 8.x.

The one step that can cause a problem is when the name of the Web server defaults to localhost. Since we were running on a mini-LAN comprising the Power Macintosh G3 and an iMac linked by a Asante FriendlyNet FS3208 Ethernet switch and we hadn't set up a DNS, we had to change the name of the server to the G3's IP address. This can be done by re-running the Assistant or by adding a ServerName entry to the file /Local/Library/WebServer/Configuration/

apache.conf. If you take the latter course, the name you provide will appear as the default if you run the Assistant again.

One trade-off you have to make is deciding where to locate the Web server's default directory. Putting it on a UFS volume maximises security, but if it's on the HFS Plus volume, authorised users can make changes from their Macs more easily.

Another restart is needed when the Setup Assistant has done its job, before your server is live. All you need to do is load the files that make up your Web site into Apache's default directory, and perhaps load some movies into the QuickTime Streaming Server's default directory (see 'QuickTime Streaming Server', page 152).

A variety of software is already available for Mac OS X Server, some of which can be found on the Third Party Solutions CD-ROM. The package also includes a full working version of WebObjects (licensed for a maximum of 50 transactions per minute), but we will concentrate on the NetBoot and QuickTime Streaming servers.

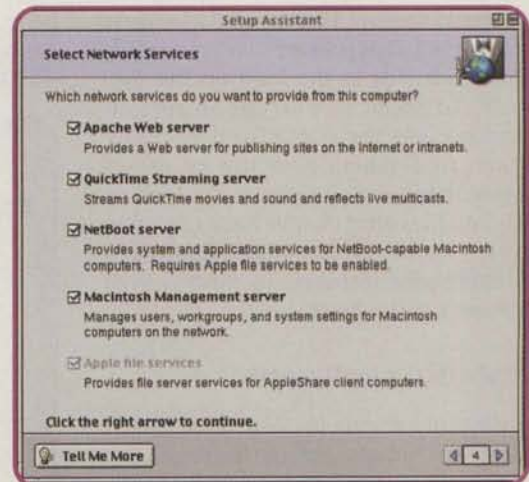
NetBoot

What the main installation routine doesn't do is set up the NetBoot server, which is provided on a separate CD-ROM. Its installation is just as simple: eight mouse-clicks, followed by a couple of minutes' wait while the software is transferred to the hard disk. Then another assistant takes over, using the answers you gave the Setup Assistant as default settings.

Installation is about a five-minute job and is unlikely to cause any problems.

The idea behind NetBoot is to allow individual Macs to boot from a disk image held on the server, instead of their own hard disks. This reduces the management load, as software need only be installed on the server, not every Mac.

According to Apple, a single 400MHz G3 with a four-port Ethernet card "can easily support 25 NetBoot client computers". Note that NetBoot only works with iMacs and 'blue and white' G3s. Also, you will probably need to update the



firmware in the clients before they can use NetBoot. The updater is provided with Mac OS X Server.

Once a Mac has successfully Net-Booted, you can open the Startup Disk control panel and make NetBoot the default startup device. You can subsequently reset it to the hard drive by using the same control panel, but the client Mac will default back to its own hard disk when the NetBoot server is unavailable.

On several occasions during our experimentation, the iMac repeatedly crashed with an address error during the early stages of NetBooting. After the usual troubleshooting steps, we found that zapping the PRAM (hold down Command-Option-P-R during a restart until the startup chime sounds a second time) cured the problem.

Macintosh Manager

Before you can start NetBooting the clients, you need to run Macintosh Manager to set up various options and to create users and groups.

The idea of a workgroup is central to Mac OS X Server and Macintosh Manager. Workgroup settings can, for example, restrict members' access to a subset of the installed applications and to particular printers (you even set a print quota). Similarly, locations from which documents can be opened or saved can be restricted, and specific access privileges applied. One such location is the Workgroup Hand In Folder, designed

with schools in mind. In this, students are granted write-only access so it acts as a 'drop box' which they can't view.

One of the clever features of NetBoot is that a user's preferences files are copied from the server to the client at login, and back again at shutdown. (This is the basic mechanism for making any computer appear to be 'yours' whenever you log in.) This process takes a few seconds and adds to the load on the network. To speed things up, Macintosh Manager lets the administrator specify which preferences files are or aren't copied in this way. Other options include deleting files after they've been copied to the server, and deleting the contents of a subfolder (for instance, to flush a Web browser's cache files).

Installing software

You install software for shared use from a client Mac, not directly onto the server. But before you attempt to do so, make sure that NetBoot is selected in the Startup Disk control panel, as the process may involve multiple restarts.

You also need to use Macintosh Manager to create a Workgroup Administrator or Global Administrator user. Log on as that user, and run NetBoot Desktop Admin. This creates a 'private copy' of the (virtual) volumes used by NetBoot users, and restarts the client Mac using that copy. You can then install software onto them and run each of the programs you've just installed (to create the preferences files and go through any serial number entry, registration or other 'first run' processes).

When that's done, mount the NetBoot volume and run NetBoot Desktop Admin to save the changes you've made. The Mac restarts yet again (that's why you should be certain that the startup device is set to NetBoot), you mount the NetBoot volume and run NetBoot Desktop Admin a third time, which gives you the opportunity to save backups of the old volumes before restarting.

After all that, the newly installed software is accessible to your users, so this is a good time to run Macintosh Manager and revoke access privileges from any workgroups that you don't want to be able to run the new programs.

QuickTime Streaming Server

Apple has recently released an update to the QuickTime Streaming Server plus the

OS X Server 1.0-1 Patch (generally recommended, but mandatory if you're going to apply the Streaming Server Update). Instructions for their installation, plus links to the files themselves, can be found at <http://til.info.apple.com/techinfo.nsf/artnum/n59004/>.



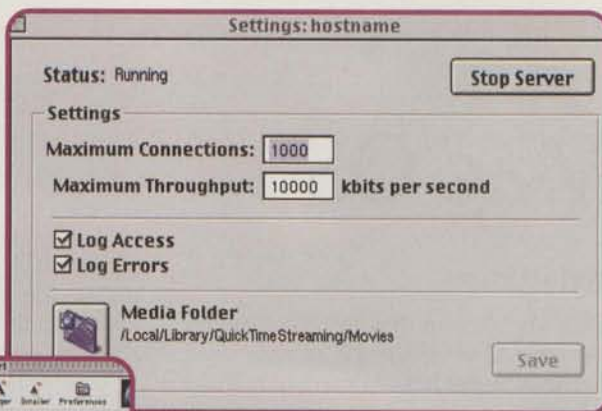
These two components are fairly small (about 1M each) so they don't take too long to download. Installation is simply a matter of following the instructions.

Using the server is similarly straightforward, assuming you selected it in the Setup Assistant. All you need to do is load 'hinted' movies into the default Streaming Server folder. Apple has provided one of its US TV ads plus a marketing video in the appropriate format in a file called SampleMovies.tar (available from the same location as the Streaming Server Update).

To convert regular QuickTime movies into hinted form requires QuickTime 4 Pro (and you'll need QuickTime 4 to play the streamed movies anyway). At the time of writing, a 'preview release' was available via <http://www.apple.com/quicktime/>. You can use your existing QuickTime Pro registration code to enable the advanced features.

You'll find tutorial material about preparing QuickTime movies for the server at <http://www.apple.com/quicktime/authoring/tutorials.html>, but the most important step is hinting.

In a nutshell, you open the movie in QuickTime Player, export it as Movie to Hinted Movie using the default settings. If the original movie was called movie.mov, you might call the hinted version movie.h.mov. Next, open the hinted



movie in QuickTime Player and then Save As with the Save Normally button selected. Be careful not to overwrite the hinted movie; you should either specify a different name or a different destination folder. This produces a small file that references the real movie.

Store the hinted movie in the Mac OS X Server directory used by the Streaming Server (by default, /Local/Library/QuickTimeStreaming/Movies) and the 'referencing' version in the same directory as the Web page that's going to reference it (probably /Local/Library/WebServer/Documents or one of its subdirectories).

When you copy a file from an HFS Plus volume to a UFS volume, Mac OS X Server will warn you that it will lose its resource fork — in this context, you can just copy the file anyway. Modify the relevant Web page by adding a line something like:

```
<embed src="movie.mov" autoplay="true"
controller="true" cache="true"
width="380" height="260">
```

where movie.mov is the name of the 'referencing' movie file, and the width and height parameters are appropriate for the dimensions of the movie. Note that the default dimensions are very small, so you'll need to specify the width and height. Remember to allow for the height of the controller.

Documentation

One of the biggest weaknesses of Mac OS X Server is that the documentation is scattered. The Installation Manual gets you started, but after that, you have to dig around README and help files, and other documents located in the Mac OS X Server and Mac OS file spaces, and on Apple's Web site. Decent, unified documentation would make life much easier for users.■

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Linux

Gnome, the GNU Network Object Model Environment, is the name for an interface designed to make Linux easier to use for people not familiar with Unix, which Linux is based on. Much as Windows was designed to provide a user-friendly interface to DOS, Gnome is doing the same for Linux, so that everyday computer users will be able to enjoy the power and reliability computer experts have come to expect from Linux.

Figure 1 shows a sample Gnome desktop. Along the bottom is the Gnome panel, which is a customisable program launcher and applet container (an applet is a mini-application). From left to right along the panel, there are the following items:

- the Gnome pager, a mini-view of the virtual desktops and their windows;
- the Gnome foot, which serves as the Main Menu button, similar to the Start button for Windows;
- another menu button, with various Gnome utility programs;
- two buttons to launch a terminal window or a Netscape window;
- a mini CD-player;
- the old sliding pieces game;
- a CPU/memory/swap load meter;
- a battery charge monitor, for those people with laptops.

The Gnome panel is completely customisable; the screenshot is only representative of what was in the panel at the time it was taken. All of the items in the panel can be moved or rearranged. There are

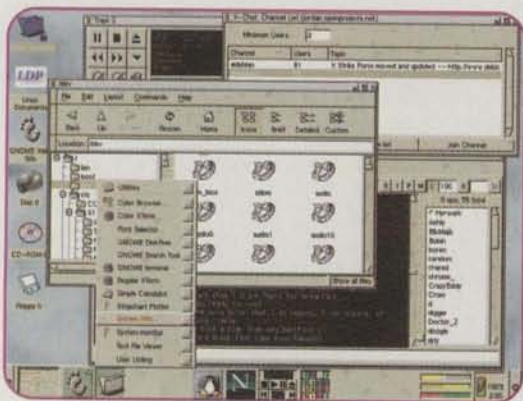


Figure 1. A sample Gnome desktop

plenty of other applets — a mail-notification utility, a disk usage monitor, an audio mixer, a clock, and a drag-and-drop printer tool.

If the panel takes up too much space, you can roll it away using one of the arrows at either end. You can extend it by adding more panels along the other sides of your screen.

The screenshot also shows xchat (a Gnome IRC client), gftp (a Gnome FTP client), gtdc (a CD player), and gmc (the Gnome file manager).

Managing files

The Gnome file manager is named gmc because it is based on the Midnight Commander (mc) file manager, which in turn looks quite similar to the Norton Commander for DOS. Features of gmc include tree, icon, brief and custom views, drag-and-drop, and virtual filesystem support. Drag-and-drop lets you do things like drag a program onto the panel to create a start button for that program, or drag an image onto the Control Center's Desktop Background settings window to set your background image.

The virtual filesystem support of gmc is a particularly interesting feature; it lets you treat certain objects such as ZIP files or remote FTP sites as if they were local directories. For example, by double-clicking on a ZIP file you will be able to see the ZIP file contents and view the files in it without having to explicitly extract the files.

Another example involves RPM or deb package files; double-click on one of these and you will be able to browse the files in the package as well as view the packaging information such as the summary, description, copyright and so on. There are also two extra files by the name of INSTALL/UPGRADE, and if you double-click on them, the package will be installed or upgraded as appropriate.

Getting help

The Gnome help browser (figure 2) is a graphical viewer for man, info, Gnome-help and other documentation. It looks and works a lot like a

Gnome's more than a pretty face for Linux.

By Geoffrey Bennett

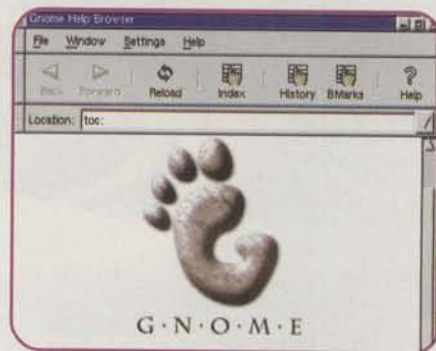


Figure 2. The Gnome Help browser

Web browser that understands an extended syntax for URLs; for example, `man:aliases(5)` to reference the man page aliases in section 5, or `info:bash` to reference the bash info page.

The help browser includes History and Bookmark features and allows you to view remote Web pages. Although it isn't yet as fast or reliable as Netscape, it does work very well as a help browser.

Window managers and themes

The window manager is the software on a Linux machine that controls the interactions with windows. The behaviour of moving, resizing and 'iconfying' windows, and the look of window borders is determined by which window manager you use and its configuration. Gnome doesn't rely on any particular window manager, but you'll need a Gnome-aware window manager to use features such as the Gnome pager. Enlightenment is the most 'Gnome-compliant' window manager at the moment, and it is included with the pre-packaged Gnome distributions (see 'Obtaining and running Gnome', on page 155).

Recent versions of Enlightenment include a configuration manager (figure 3) which allows you to customise many aspects of its behaviour using a GUI interface interactively, rather than by editing text files.

Enlightenment is one of the most configurable window managers available. This configurability is achieved with themes, which are a collection of files that define how Enlightenment should look and behave. The Web site at <http://e.themes.org/> has been set up to provide

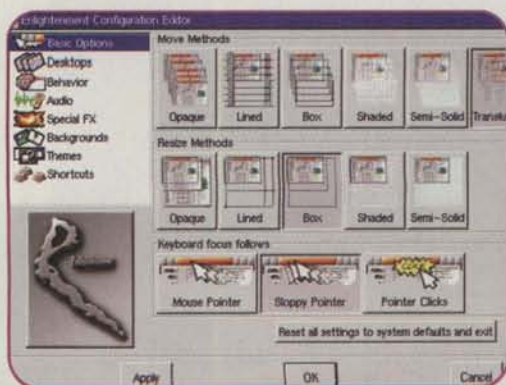


Figure 3. The Enlightenment configuration manager

a clearing house for Enlightenment themes, of which there are almost 100. If you find a theme that you like, you can download it to `/usr/share/enlightenment/themes` by typing `tar xvfz the-theme-name.theme`. The theme will then appear in the Enlightenment Configuration themes menu. Once you have extracted the theme using `tar`, you no longer need the `.theme` file.

Gnome can also be customised through the use of themes, which will change the way that window backgrounds, scrollbars, checkboxes and the other elements of the Graphical User Interface (GUI) appear. Figure 4 shows the Gnome Control Center's Theme Selector, with the Brushed Metal theme in the main window, and the Pixmap theme in the preview window. The theme used in figure 1 is called Cheese.

More themes are available from <http://gtk.themes.org/> (gtk is the GIMP toolkit, which GIMP, Gnome and many

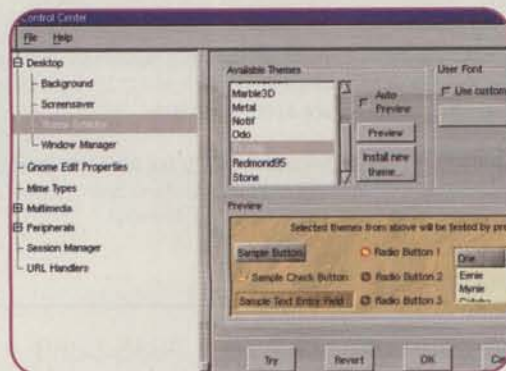


Figure 4. Two sample GTK themes

other free software products use). You can install these from the Theme Selector, or follow the same procedure as for installing an Enlightenment theme, except that the theme file should be placed in the `/usr/share/themes` directory instead of `/usr/share/enlightenment/themes`.

Obtaining and running Gnome

Gnome is included in the latest versions of many Linux distributions, but it can be downloaded separately from a Gnome mirror FTP site (the MIRRORS file at <ftp://ftp.gnome.org> has the official list of mirrors). Precompiled packages are available there for Red Hat Linux, Debian GNU/Linux, SuSE and Slackware distributions.

After compiling and/or installing the packages, you'll need to edit the `.Xclients` (for Red Hat Linux), `.xinitrc` (if you start X from text mode using `startx`), or `.xsession` (if you use `xdm`) file. The file should contain two lines:

```
#!/bin/bash
exec Gnome-session
```

`Gnome-session` is Gnome's session manager, which is responsible for saving the state of your desktop, keeping track of which applications should be automatically loaded, saving and restoring screen-saver, mouse and keyboard properties, as well as starting your window manager.

The X startup script should also be made executable, for example by typing `chmod +x .Xclients`. Next time you start X, the file you just created will override the defaults. To return to the original behaviour of X, just remove the file (or restore the original).

GDM

The Gnome display manager (GDM) is a replacement for the standard X display manager (XDM). A display manager is responsible for keeping X running all the time and providing a graphical login prompt. On most Linux distributions, switching to runlevel 5 will start XDM. To check this, type `init 5` when logged in as root from the text-mode command line. To make runlevel 5 the default when you start Linux, edit the `/etc/inittab` file and change the number 3 to a 5 on the 'initdefault' line (it will be one of the first lines in the file).

To switch from XDM to using GDM, look for this line in `/etc/inittab`:

```
x:5:respawn:/usr/bin/X11/xdm -nodaemon
```

and change it to:

```
x:5:respawn:/usr/bin/gdm -nodaemon
```

GDM's advantages over XDM include support for shutting down, rebooting, or suspending the machine from the login prompt, selection of which language you want messages displayed in, and the selection of the environment you want to use (whether it be Gnome, KDE, AfterStep, `fvwm`, or something else). See the file `gdm-manual.txt` in `/usr/doc/gdm-*` for information on customising GDM.

Gnome applications

The applications included with Gnome include a file viewer, a text editor, a notepad, an appointment calendar, a time tracking utility, an image viewer, a spreadsheet, and a number of games. As well as those applications included with the packaged Gnome distribution, there are a lot more either under development or ready for use. A list of Gnome software packages is available at the Gnome Software Map (<http://www.gnome.org/applist/>).

The major application currently lacking from the free software line-up is a traditional word processor. `Lyx` is an alternative that is more suitable than a word processor for many types of documents. The end result looks better and can be achieved in less time, but because it does not pretend to be a desktop publishing program, `Lyx` isn't suitable for all types of documents. To find out more about `Lyx`, see <http://www.lyx.org/>.

There are a few free software word processors currently under development; `Go` (<http://www.gnome.org/applist/view.php?name=Go>) and `KWord` (<http://koffice.kde.org/>) are two examples, but neither are quite ready for final release.

At least three proprietary WYSIWYG word processors are available for Linux. These include `Applixware` (<http://linux.applix.com/>), `WordPerfect` (<http://linux.corel.com/linux8/>), and `Star Office` (<http://www.stardivision.com/>). `Applixware` and `Star Office` are also full office-suite products, which include spreadsheet and presentation graphics functions.

Summary

The combination of Linux and Gnome is not yet an alternative for everyone because of its lack of certain applications, but with the recent Gnome 1.0 release, the market for Linux has significantly increased. Linux is already known as an extremely capable server and workstation OS, and this will certainly speed up Linux's move into the desktop arena. ■

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Pointers are the bane of poor programmers, but you can master them.

By Michael Smith

Simple C++

f all the concepts you must master when learning C++, one of the most critical is pointers. If you fully understand the use of pointers, they will become one of your most valuable tools. If your understanding is inadequate, they will haunt you for the rest of your days.

Addresses

When you declare a variable, the program uses that variable as an alias for a physical memory location in the computer. That is actually an oversimplification, but is adequate for the purposes of this discussion.

```
int i;
```

This declaration sets aside a location of memory suitable to hold an integer. It does not initialise the integer with any sensible value. If you try to use the integer without initialising it, you will find that it contains random garbage.

```
int i=0;
```

This integer is initialised to a known value. It may now be used with confidence. Now when *i* is initialised to 0, the program stores the value of 0 at a particular memory address. Sometimes it's useful to know what that memory address is. You can find that out using the address operator `&`.

```
int i=0;
std::cout << i << " is stored at address " <<
&i << "\n";
```

Pointers

A pointer is a variable that is suitable to store the address of another variable.

```
int *p;
```

p is a variable, which is suitable to store the address of an integer. It is important to note that it does not yet contain a useful

address; it must first be initialised.

```
int i=0;
int *p=&i;
```

In this example, *p* has been initialised — it now contains the address of *i*. Once a pointer is initialised to point to a valid piece of memory, you can access that memory via the pointer. The expression `*p` means 'the element which *p* points to'. In this case, `*p` is equivalent to *i*.

Consider the example `pointer.cpp` (the source code is also on [apcmag.cd](#)):

```
#include <iostream>

int main( void )
{
    int i=3, j=6;
    int *p;

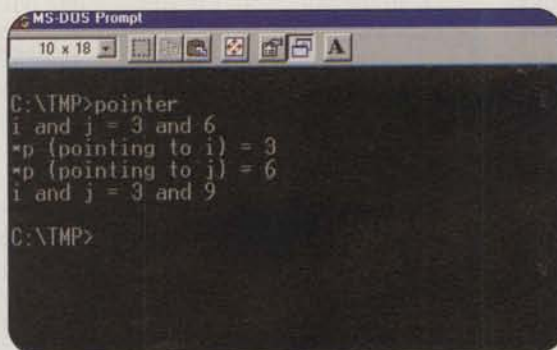
    std::cout << "i and j = " << i
               << " and " << j << "\n";
    p = &i;
    std::cout << "*p (pointing to i) = "
               << *p << "\n";
    p = &j;
    std::cout << "*p (pointing to j) = "
               << *p << "\n";

    *p = 9; // THIS MODIFIES J
    std::cout << "i and j = " << i
               << " and " << j << "\n";

    return 0;
}
```

You see that assigning directly to the pointer (`p = . . .`) changes the address to which the pointer points. Assigning indirectly (`*p = . . .`) changes the contents of the address to which the pointer points. This is a critical distinction.

The pointers in these examples are all integer pointers, which are pointers intended to point to an integer. There are



different types of pointers to point to different types of data. Here are some common examples:

```
char *pchar;    // Pointer to a character.
int *pint;      // Pointer to an integer.
double *pdouble; // Pointer to a double.
void *pvoid;    // A generic pointer.
char **ppoint;  // A pointer to a pointer.
```

Two of these are worth some extra comment. A void pointer (literally a pointer to nothing) is used as a generic pointer where nothing may be assumed about the location to which it points. The pointer `ppoint` is a pointer that is intended to point to another pointer; in this case the second pointer is a pointer to a character.

Remember the `halve()` function from Simple C++ a few months ago (see APC April, page 145)?

```
void halve( double& val )
{
    val = val / 2;
}
```

Another way to write this function is to pass the address of the `val` variable.

```
#include <iostream>
void halve( double *pval )
{
    *pval = *pval / 2;
}

int main()
```



```
{
    double d=10;

    // COMPUTE HALF
    std::cout << "Half of " << d << " equals ";
    halve( &d );
    std::cout << d << "\n";

    return 0;
}
```

The C language doesn't support references, so passing the address of the variable is the only way a function like this can work. In C++ the reference method is simpler, and is usually preferable.

Casting

Sometimes you may want to assign the contents of a variable to another variable of a different type. This can be done using casting.

```
int i1=5;
double d1=(double)i1;
double d2=double(i1);
double d3=1.9;
int i2=int(d3);
```

The cast used for d1 is a C style cast, supported for backward compatibility. The cast for d2 is an alternate C++ style of casting. The result of casting an int to a double is fairly obvious. Both d1 and d2 are set to 5.0. Casting a double to an int causes truncation, not rounding, so i2 is set to 1, not 2.

You can also cast pointers, but the results are less obvious.

```
int i=0;
int *pint=&i;
double *pdouble=(double *)pint;
```

As discussed before, pointers can contain the address of a memory location. It's easy enough to take the address of an integer and assume that it's really the address of a double, but it probably won't be the address of a valid double. Using the cast is saying to the compiler 'I know what I'm doing here, so don't complain'. If you don't have an intimate knowledge of the internal representation of pointers and numbers then you run a good chance of crashing your program (or worse). There are some good reasons to cast pointers, and we'll cover some of them later on, but be very wary.

Pointers and arrays

In C++, the distinction between pointers and arrays is somewhat blurry. It is com-

mon to set a pointer to point to an array of data. Having done that, just about anything that can be done to the array can also be done to the pointer.

```
int iarr[10];
int *p=iarr;
int *q=&iarr[0];
int *r=&iarr[2];
```

Both p and q now point to the beginning of the array. p[0] is equivalent to q[0] and both are equivalent to iarr[0]. r points to the third element of iarr, so r[2] is equivalent to iarr[5]. That can be a little confusing, but it can also be used to simplify things. You can even refer to r[-1], which is equivalent to iarr[1]; however, this is even more likely to cause confusion and is only rarely appropriate.

Consider the following example, dump.cpp (also on **apcmag.cd**):

```
#include <iostream>

void dump_array( int *arr, int num )
{
    int i;

    for (i=0; i<num; i++)
        std::cout << arr[i] << '\n';
}

#define NUM 5
int main( void )
{
    int iarr[NUM]={5,10,15,20,25};

    dump_array( iarr, NUM );
    return 0;
}
```

Passing the array name iarr passes a pointer to the beginning of the array. One important fact becomes evident here. The function dump_array() has no way to tell the length of the array arr, it relies on being told the correct length via the parameter num. If you accidentally pass the wrong length the program will compile without a problem, but it will not execute correctly. This type of error, known as 'array overrun' or 'buffer overrun' is among the most common in C++ programs — and can also be one of the hardest to find.

NULL pointers

One of the problems we face is that you can't easily test whether a pointer has been initialised properly. An address is just a number, and a valid address looks

pretty much like an invalid one — at least until you try to use it. Sometimes we need to be able to tell if a pointer has set to valid memory or not. To help with this, C++ defines a special pointer value called 'NULL'. If you are not ready to initialise a pointer to a valid address, you can initialise it to NULL. You can later test the value:

```
char *data=NULL;

if (you_have_valid_data)
    data = some_valid_data;
// ... other stuff
if (data!=NULL)
    do_something( data );
// ... etc
```

Although NULL does not necessarily have the numeric value of zero, the compiler will always treat it as zero. So if (data) is logically identical to if (data!=NULL). It's a matter of taste which one you use.

A special case: C strings

The C style string is a special type of array that was inherited (not surprisingly) from C. This is an array of characters with an ASCII zero character ('\0') at the end. The '\0' character is not to be confused with the ASCII character for the number zero ('0') which has an ASCII value of 48.

```
char *str="ABC";
```

The string "ABC" is actually an array of four characters. The first three are obvious — A, B and C — and an extra zero character is automatically added. The zero character is usually called a NUL character (with one L), not to be confused with NULL (with two Ls) which is the NULL pointer. This can be confusing, so let's reiterate.

| | |
|------|---|
| NUL | A character with an ASCII code of zero. Usually written '\0'. |
| NULL | A special pointer that represents an invalid address. |
| 0 | The number zero, which has an ASCII code of 48. |

C++ provides better ways to handle strings, but you'll probably need to know how to deal with C strings as there's lots of legacy C code about.

Next month we'll look further into pointers, and at dynamic memory allocation.

The fundamental concepts of good programming practice.

By David Williams

Java

Objects and variables are in one sense the raw materials of programming. By creating and manipulating variables, programs perform calculations, receive input from users, and generally 'do things'.

This month we are going to take a look at the *scope* of a variable. This refers to the effective range of the program for which a variable is valid. It is essential to understand scope, because it is important in good programming practice. Let's look at an example of what scope really means, in practice. Consider this Java code:

```
public class class1 {
    public static void main (String args []) {
        int a = 5;
        BadMethod ();
    }

    private static void BadMethod () {
        System.out.println ("a = " + a);
    }
}
```

Note that the code will not compile. However, the intention should be clear: the variable *a* is defined and given a value. The main method calls a second method whose purpose is to print out a message followed by the value of the variable *a*. Yet, the Java compiler is very unhappy with this and responds:

```
class1.java:12: Undefined variable: a
    System.out.println ("a = " + a);
                        ^
1 error
```

You can see that the variable *a* is undefined. It was defined in the main method, but that's exactly the point. The variable *a* is local to the main method. It does not exist in the *BadMethod* method. When you call *BadMethod* from main, the variable *a* is no longer in scope.

Try the following:

```
public class class2 {
    private static int a;

    public static void main (String args []) {
        a = 5;
        GoodMethod ();
    }

    private static void GoodMethod () {
        System.out.println ("a = " + a);
    }
}
```

```
}
private static void GoodMethod () {
    System.out.println ("a = " + a);
}
}
```

If you compiled and ran this program, it would work as expected. The only significant difference is that the variable declaration has moved outside the main method. This means it is now global to the entire class. In other words, the variable exists in every method in the class. Its scope is the whole class. Previously, the scope of *a* was simply the main method. Hopefully this explains the scope of a variable: essentially, it is the range of the program for which the variable is visible and effective. This has some interesting ramifications.

```
public class class3 {
    public static void main (String args []) {
        int a = 5;
        System.out.println ("a = " + a);
        AnotherMethod ();
        System.out.println ("a = " + a);
    }

    private static void AnotherMethod () {
        int a = 6;
        System.out.println ("a = " + a);
    }
}
```

```
public class class4 {
    private static int a;

    public static void main (String args []) {
        a = 5;
        System.out.println ("a = " + a);
        OneMethod ();
        TwoMethod ();
        System.out.println ("a = " + a);
    }

    private static void OneMethod () {
        int a = 6;
        System.out.println ("a = " + a);
    }

    private static void TwoMethod () {
        System.out.println ("a = " + a);
    }
}
```

You can see the output of this program in figure 1. Note that the value 5 is printed twice with an intervening value 6. The two 5s are from the printing methods in the main method, and the value 6 comes from the intervening call to *AnotherMethod*.

Although both methods create a variable called *a*, they are not the same variable. When 6 is assigned in *AnotherMethod*, the value 5 is not being overwritten. Rather, a new variable has been created and given the value 6. In fact, in *AnotherMethod* the first variable *a* from the main method is not visible. Remember the error message we got from the first example, *class1*, above?

Think about it carefully. Each variable *a* is only visible within its own method. The scope of each variable is solely its own method.

As a final example, let's modify the previous code slightly.

```
> java class2
The value of a is 5
>
> java class3
The value of a is 5
The value of a is 6
The value of a is 5
>
> java class4
The value of a is 5
The value of a is 6
The value of a is 5
The value of a is 5
>
> java class5
The value of a is 5
>
> java class6
The value of a is 5
The value of aa is 5
The value of a is 5
>
> java class7
The value of a is 5
The value of a is 6
>
> java class8
Fred -- Bill
$430 -- $280
> █
```

Figure 1

```
public class class4 {
    private static int a;

    public static void main (String args []) {
        a = 5;
        System.out.println ("a = " + a);
        OneMethod ();
        TwoMethod ();
        System.out.println ("a = " + a);
    }

    private static void OneMethod () {
        int a = 6;
        System.out.println ("a = " + a);
    }

    private static void TwoMethod () {
        System.out.println ("a = " + a);
    }
}
```

This time the output is similar, but notice the declaration of the first variable *a* has moved. In method *TwoMethod* you don't even have a declaration for a variable *a*, yet the code compiles and runs.

Here, there is the variable *a* with a

scope of the entire class. This is the variable `a` that is used in the `main` and `TwoMethod` methods. Yet, in `OneMethod` a new variable `a` is declared. It has the scope of just its own method, and it is its value that is displayed in the `println` statement in that method.

This shows two things. One is that two variables with the same name can exist together, provided their scopes are different (you cannot declare two variables with the same name at the same level). The other is that Java will favour the variable with the smallest scope. So when `OneMethod` tries to print the contents of the variable `a`, Java chooses the variable with the smallest scope (the one that has the scope of just that method rather than the whole class). As before, setting the value of this variable `a` does not affect the other variable `a` with the wider scope.

The benefits of scope

Now that you have an understanding of scope, let's see why it is useful.

First, the rules of scope help avoid ambiguity. Understanding scope means you can predict the output of the programs above. If we did not have such rules, what would happen in `class4`? Which variable `a` would be displayed in the `OneMethod` method? Indeed, would the program refuse to compile? Historically in programming languages that had some undefined features (such as some pointer arithmetic operations in C), program behaviour would vary from compiler to compiler because vendors implemented certain obscure items differently. Such unpredictability is contrary to the basic philosophy of Java and its platform neutrality.

Second, when programmers enforce a rule of minimum scope upon their programs it eases debugging by localising the extent of variables. This means programmers are required to be careful when declaring variables, so that a variable does not have greater scope than it really needs. For example, the scope of the variable `a` here is too large:

```
public class class5 {
    private static int a;

    public static void main (String args []) {
        SomeMethod ();
    }

    private static void SomeMethod () {
        a = 5;
```

```
        System.out.println ("a = " + a);
    }
}
```

In this case, the variable `a` is used just in the `SomeMethod` method. Yet, its scope is the entire class. This is not necessary. The declaration properly belongs in the `SomeMethod` method itself.

If programmers are precise and diligent with variable scopes, many common problems can be averted. Let's modify the previous example and present a situation that has an error:

```
public class class6 {
    private static int a;

    public static void main (String args []) {
        a = 5;
        System.out.println ("a = " + a);
        SomeMethod ();
        System.out.println ("a = " + a);
    }

    private static void SomeMethod () {
        int aa = 6;
        System.out.println ("The value of aa is " +
        a);
    }
}
```

In this case the variable `a` is declared to have the scope of the whole class. In the `main` method, you assign a value to it and print this out. Notice the `SomeMethod` method, where a new variable called `aa` is declared, and although our `println` message says the content of `aa` is being displayed, only the value of `a` is actually being displayed.

This program would compile and run — after all, it is valid syntax — but it is likely the programmer made a mistake and intended to display the value of the variable `aa`, but inadvertently typed `a`.

If the programmer had been careful with the scope of the variable `a`, this error would have been flagged at compile time, because the program simply would not have compiled — just like the first example here.

A third advantage is related: that a programmer can be much more confident of not inadvertently setting the value of the wrong variable. Consider the following example:

```
public class class7 {
    private static int a;

    public static void main (String args []) {
        a = 5;
```

```
        System.out.println ("a = " + a);
        SomeMethod ();
        System.out.println ("a = " + a);
    }
}
```

```
    private static void SomeMethod () {
        int aa = 2;
        // some processing
        a++;
        // some processing
    }
}
```

Here, it is assumed there is some significant processing in the `SomeMethod` method. When you run this program you will see that the value of `a` increments in `SomeMethod` and the two `println` statements show this. Yet, it is quite likely that the variable `aa` was meant to be used. In other words, the programmer has accidentally altered the value of `a` in `SomeMethod`. This could even have significant ramifications on the execution of the `main` method when suddenly a variable's value changes unexpectedly during the course of execution.

Programmers who are diligent about applying only the scope that is necessary protect themselves from accidentally damaging objects and variables.

As a concluding note, you would have seen the `public` and `private` keywords in just about any Java code you have read. This also relates to scope. Scope in the context we have discussed here refers to the visibility of a variable, method or class over an entire project — which means a collection of several classes working together to make a useful program.

You may recall the students program from last month (see *APC* June, page 165, and also `class8.java` on apcmag.cd). That program used two classes. The `Student` class is created as needed in the `main` method, and its methods and variables are used. Notice that the `main` routine can only interact with the bank balance through the `depositMoney` method and the various routines to spend money.

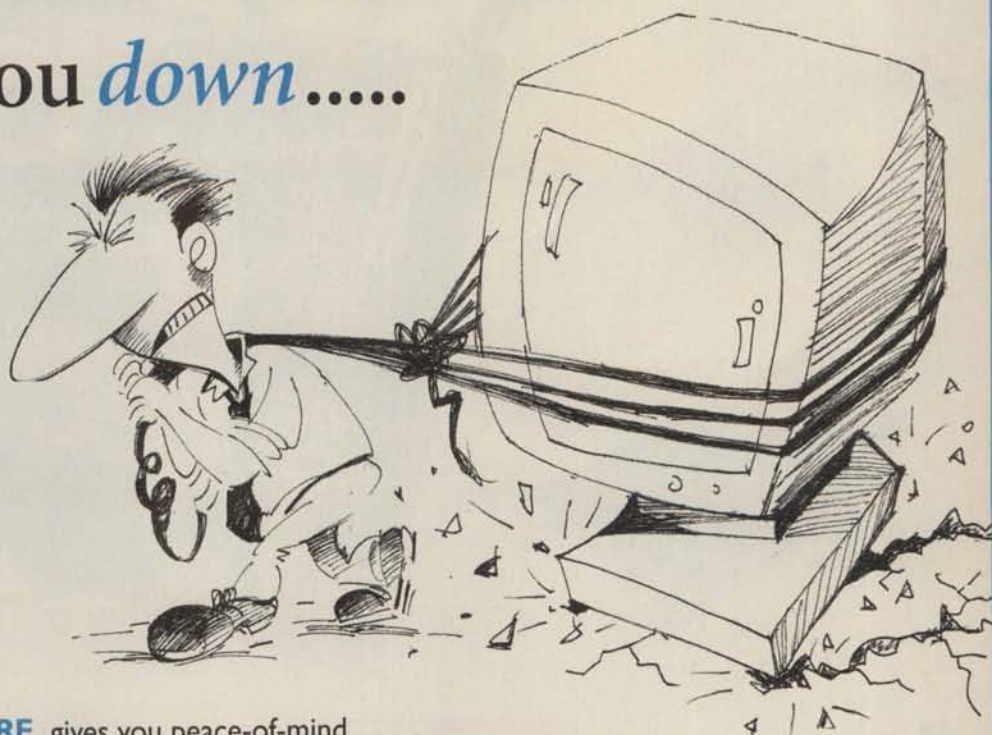
There is a good reason for this, and I'm sure you've guessed it — the `BankBalance` variable is declared to be `private`, which means it is only visible in the `Student` class itself. If the `main` method tried to use the `BankBalance` variable of one of its `Student` objects, then an error would occur when we tried to compile it. Yet, the `depositMoney` method is declared to be `public`, so it can be called directly from the `main` method.■

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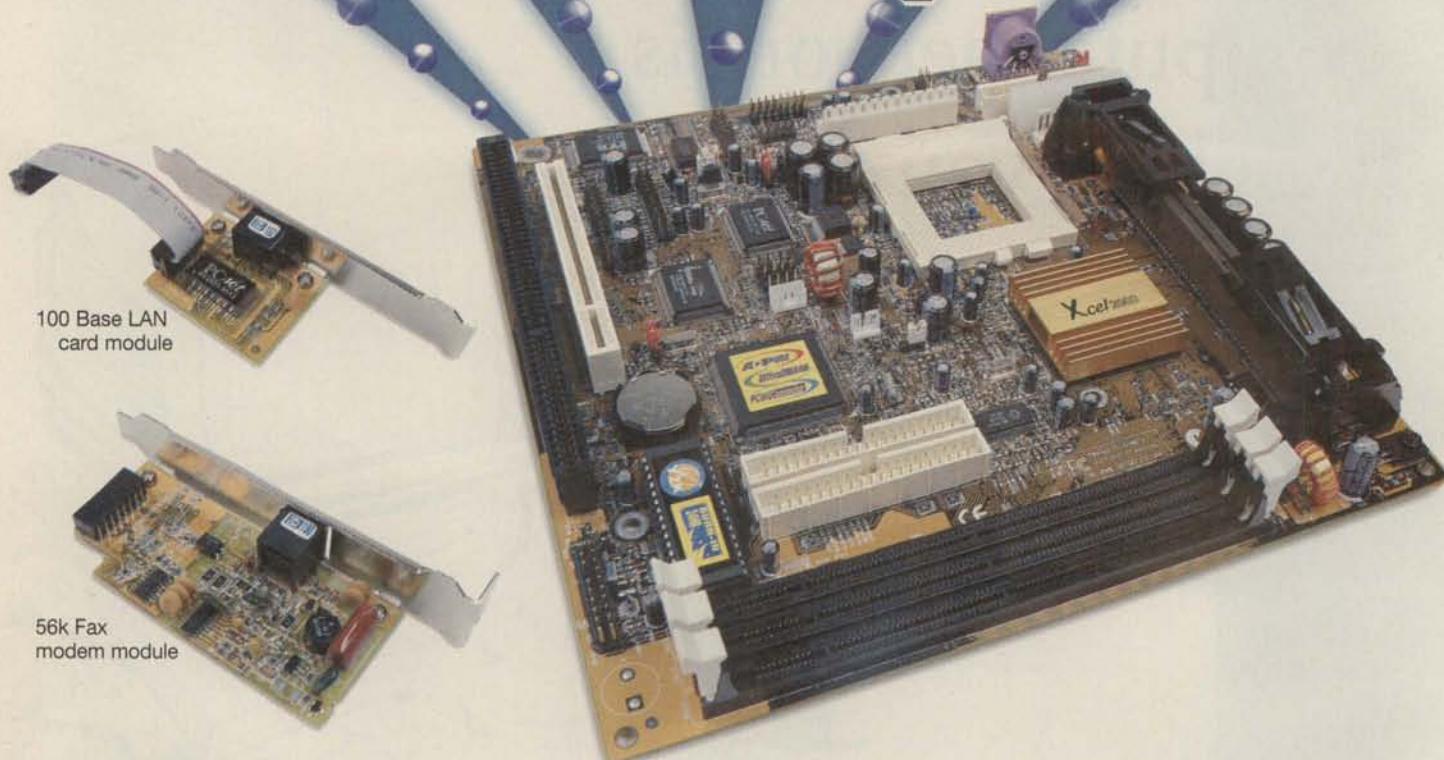
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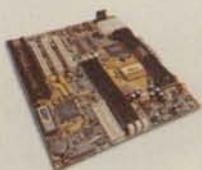
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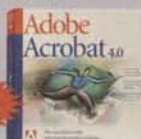
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| KEYBOARD | - | 104 Honeywell Spacemate PS/2 Keyboard |
| MOUSE | - | Microsoft Intellimouse OEM |
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| SOUND CARD | - | Genuine Creative PCI 64 Sound Card |
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| SOFTWARE | - | Windows 98 in CD fully Installed & Configured |
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| CASING | - | ATX Midi Tower Casing with 250W Power Supply |
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| MOUSE | - | Logitech PS/2 Mouse |
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| SOUND CARD | - | Genuine Creative PCI 32 Sound Card |
| SPEAKERS | - | 480W PMPO Stereo Speakers |
| NETWORK | - | SkyMaster PCI 10/100 RJ45 |
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| HARD DRIVE | - | 4.3Gig ULTRA ATA EIDE Hard Disk Drive |
| FLOPPY DRIVE | - | 1.44M, 3.5" Floppy Disk Drive |
| VIDEO CARD | - | 8M AGP built-in |
| MONITOR | - | 15" ACER 54e Monitor (3 Year On-site Warranty) |
| CASING | - | ATX Midi Tower Casing with 250W Power Supply |
| KEYBOARD | - | 104 Windows Keyboard PS/2 |
| MOUSE | - | Serial Mouse |
| CD-ROM | - | 40X EIDE CD ROM Drive |
| SOUND CARD | - | Built in 16 Bit Sound Card |
| SPEAKERS | - | 80W PMPO Stereo Speakers |
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| FLOPPY DRIVE | - | 1.44M, 3.5" Floppy Disk Drive |
| VIDEO CARD | - | 16Mb Voodoo Banshee Video & Games Card |
| MONITOR | - | 15" ACER 54e Monitor (3 Year On-site Warranty) |
| CASING | - | ATX Midi Tower Casing with 250W Power Supply |
| KEYBOARD | - | 104 Windows Keyboard PS/2 |
| MOUSE | - | Logitech PS/2 Mouse |
| CD-ROM | - | 40X EIDE CD ROM Drive |
| SOUND CARD | - | Diamond MX-300 Sound Card OEM |
| SPEAKER | - | 480W PMPO Stereo Speakers |
| SOFTWARE | - | Windows 98 in CD fully Installed & Configured |
| MODEM | - | 56K V.90 internal Voice/Fax/Modem |

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| MOTHERBOARD | - | Gigabyte GA686BXC Intel BX Chipset Motherboard |
| MEMORY | - | Premium Grade 64Mb SDRAM PC100 |
| HARD DRIVE | - | 8.4Gig ULTRA ATA EIDE Hard Disk Drive |
| FLOPPY DRIVE | - | 1.44M, 3.5" Floppy Disk Drive |
| VIDEO CARD | - | 8M i740 AGP Video Accelerator Card |
| MONITOR | - | 15" ACER 54e Monitor (3 Year On-site Warranty) |
| CASING | - | ATX Midi Tower Casing with 250W Power Supply |
| KEYBOARD | - | 104 Windows Keyboard PS/2 |
| MOUSE | - | Logitech PS/2 Mouse |
| CD-ROM | - | 40X EIDE CD ROM Drive |
| SOUND CARD | - | Genuine Creative PCI 32 Sound Card |
| SPEAKERS | - | 480W PMPO Stereo Speakers |
| SOFTWARE | - | Windows 98 in CD fully Installed & Configured |
| MODEM | - | 56K V.90 internal Voice/Fax/Modem |

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|-------|---|-----------------------------------|---|----------|
| PRICE | - | \$ 1750 or \$14/Week ¹ | - | PII-400 |
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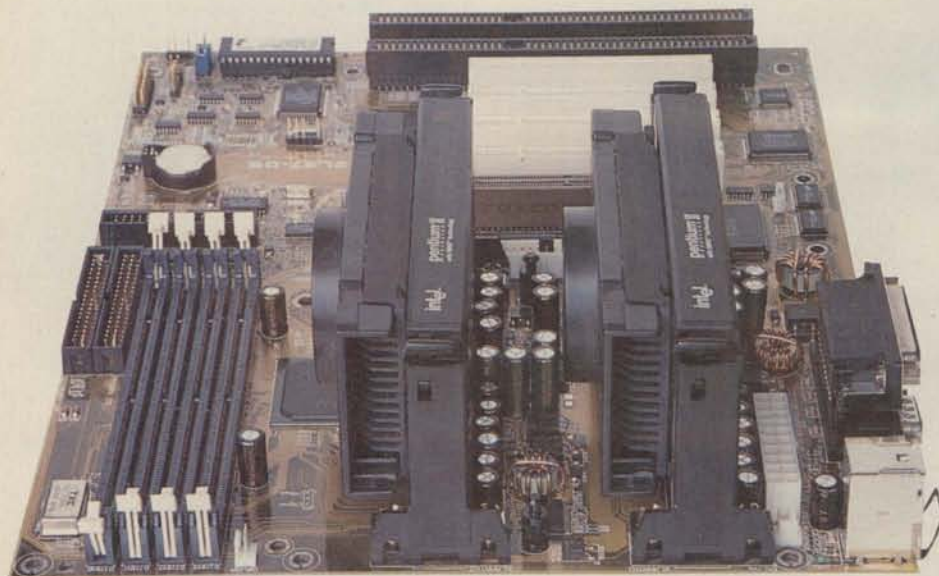
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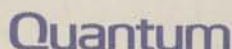
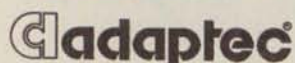
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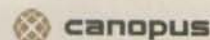
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From
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Voltage : DC 12V

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Current: 0.13mA



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DAJ06

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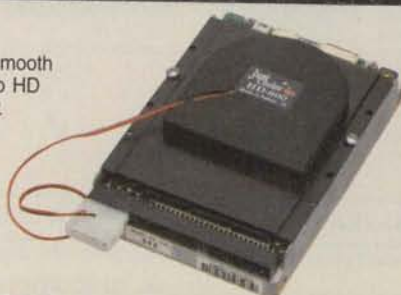
Air Flow : 18CFM

Voltage : DC 12V

Current : 0.12A

Power : 1.44W

Dimension : 115x100x11mm



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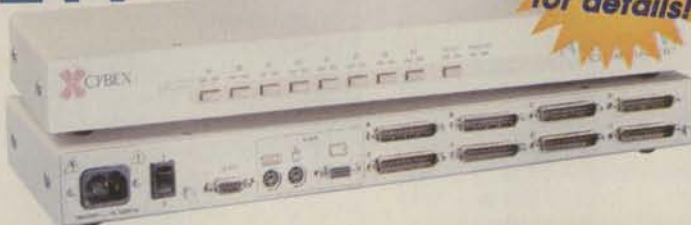
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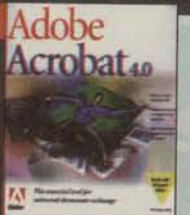
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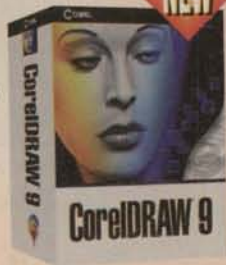
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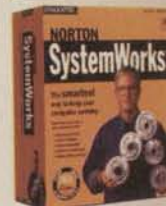
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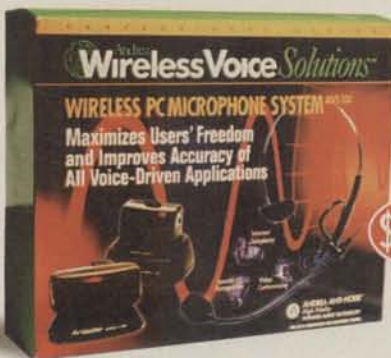
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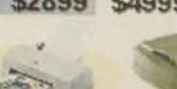
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| K5BK | 6 |
| K1BK * | 9 * |
| K7BK | 60 |
| K8BK | 7 |
| K4BK | 7 |
| K9BK | 7 |
| K10BK | 15 |
| K11BK | 12 |
| K12BK | 50 |
| K12BK | 9 * |
| K19BK | 2 |
| K13BK | 12 |
| K16BK | 12 |
| K14BK | 12 |
| K15BK | 8 |
| K17BK | 12 |
| K17BK | 12 |
| K17BK | 12 |
| K21BK | 3 |
| K26BK | 12 |
| K6BK | 12 |
| K6BK | 12 |
| K18BK | 6 |
| K24BK | 6 |
| K25BK | 6 |
| K20BK | 8 |

Colour Kits

| code | No refills |
|--------|------------|
| K9CLR | 12 |
| K10CLR | 12 |
| K22CLR | 6 |
| K11CLR | 6 |
| K12CLR | 3 |
| K12CLR | 3 |
| K9CLR | 12 |
| K25CLR | 6 |
| K1CLR | 30 |
| K2CLR | 12 |
| K2CLR | 12 |
| K23CLR | 6 |
| K3CLR | 8 |
| K4CLR | 4 |
| K5CLR | 30 |
| K5CLR | 30 |
| K24CLR | 12 |
| K15CLR | 12 |
| K20CLR | 12 |
| K7CLR | 12 |
| K6CLR | 12 |
| K6CLR | 6 |
| K20CLR | 12 |
| K8CLR | 6 |
| K17CLR | 12 |
| K34CLR | 3 |
| K16CLR | 12 |
| K16CLR | 12 |
| K35CLR | 6 |
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| K13CLR | 12 |
| K13CLR | 12 |
| K29CLR | 12 |
| K30CLR | 12 |
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| | | | | USB CONTROLLER CARD 2 x USB PORTS | 414 |
| | | | | 4-PORT USB HUB WITH POWER | 93 |
| | | | | MODEMS 56.6 STD - 56.6 HIGH END | |
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| | | | | 56.6 EXTERNAL VOICE/FAX/DATA STD | 105 |
| | | | | 56.6 EXTERNAL VOICE/FAX/DATA DYNALINK | 123 |
| | | | | 56.6 PCMCIA FAX/DATA MODEM | 165 |
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| | | | | CASE AIR CONDITIONING EXHAUST FAN | 84 |
| | | | | MICRO/SIDEWINDER FORCE FB JSTICK | 286 |
| | | | | MICRO/SIDEWINDER FORCE FB WHEEL | 363 |
| | | | | NEZOOM COM. PC/ISA COMBO CARD | 40 |
| | | | | ETHERNET 100MPS COM. PCI CARD | 54 |
| | | | | FLOPPY 3.5" 1.44MB STD | 32 |
| | | | | FLOPPY 3.5" 1.44MB PANASONIC | 34 |
| | | | | 16 BIT I/O 16550 UART CONTROLLER | 47 |
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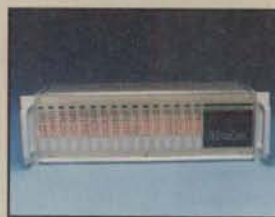
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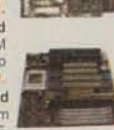
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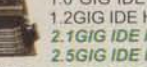
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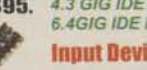


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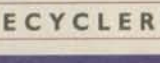
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Index

SYSTEMS/NOTEBOOKS

- Adelong Systems 2
- Adelong Systems 3
- Adelong Networks 4
- IBM Aptiva 5
- Palm PDA 5
- Toshiba Notebooks 6
- Compaq/Twinhead 7
- Olympic Notebooks 8

COMPONENTS

- Gigabyte 8
- ADOpen Motherboards 9
- Processor / Memory 10
- SOUND CARDS
- Diamond Multimedia 13
- Creative Labs 15
- Altec Lansing 16

SCANNERS

- Western Digital 11
- Seagate/IBM/Quantum 12

VIDEO CARDS

- Diamond Multimedia 13
- Skywell 14
- Matrox 15

MONITORS

- LiteOn 22
- Mitsubishi 23
- Videocom 24

PRINTERS, SCANNERS

& DIGITAL CAMERAS

- Kodak Cameras 19
- Olympic/HP/Umax Scanners 27
- Canon 28
- HP/Epson 29

STORAGE

- Kodak 19
- Omega 20
- ORB/Ricoh 21
- Olympic CDR/DVD 22
- Mitsubishi 23

NETWORKING

- Adelong Networks 4
- Netgear 24
- D-Link 25

SOFTWARE

- Microsoft 26
- Symantec 26
- M.Y.O.B 26
- Check2000 26
- PowerQuest 26

MODEMS

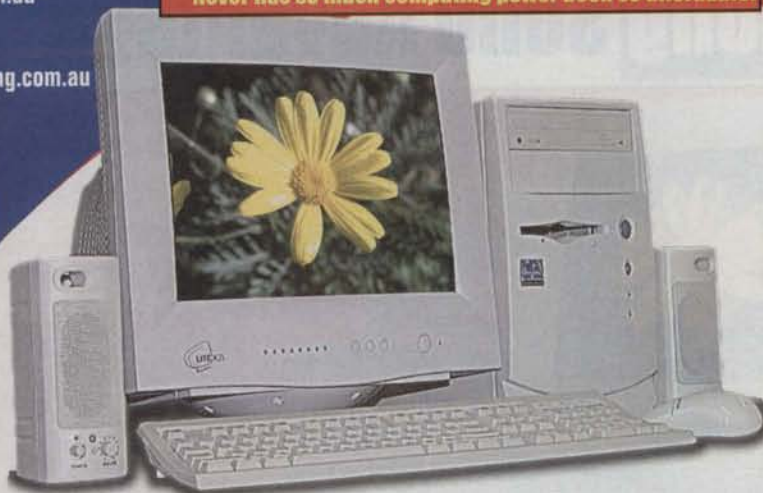
- Netcomm 17
- USRobotics 17
- Swan 17
- Dynalink 18

MISCELLANEOUS

- CPU / Video Splitters 30
- USB Devices 31
- Cases / Power Supply 31
- Terms & Conditions 32
- Order Form 32

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See Page 8 for 5AX Mainboard specs

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- ◆ 8MB AGP Graphics Accelerator
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- ◆ 6X DVD-ROM Drive
- ◆ Diamond Monster MX300
- ◆ Altec Lansing ACS45.1
- ◆ 17" Colour Monitor
- ◆ Deluxe ATX Case
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- ◆ Windows 98

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- ◆ 16MB Diamond Viper V550 AGP
- ◆ 6X DVD-ROM Drive with Software DVD
- ◆ Diamond Monster MX300
- ◆ Altec Lansing ACS45.1
- ◆ 19" Colour Monitor
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- ◆ 16MB Diamond Viper V550 AGP
- ◆ 6X DVD-ROM Drive with Software DVD
- ◆ Diamond Monster MX300
- ◆ Altec Lansing ADA305 Digital Dolby
- ◆ 19" Colour Monitor
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- ◆ Microsoft Intellimouse
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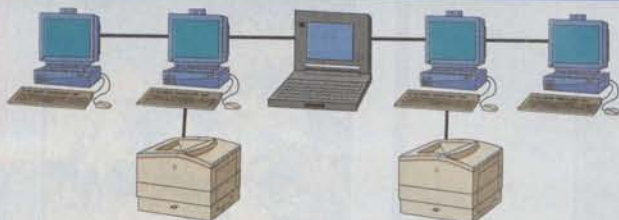
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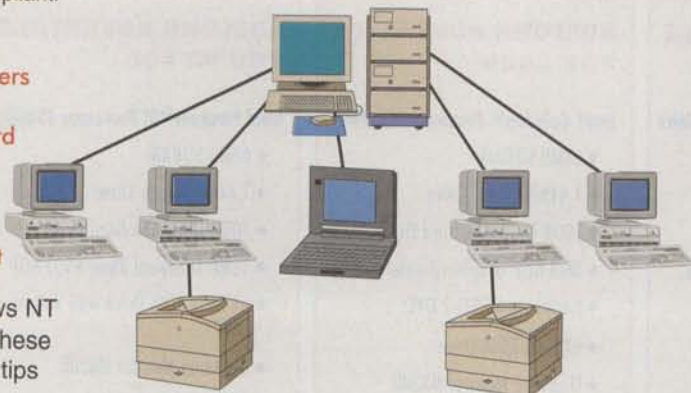


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- 5 Hours of Technical Support



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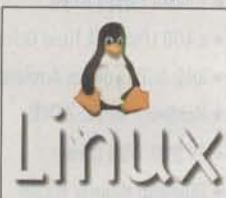
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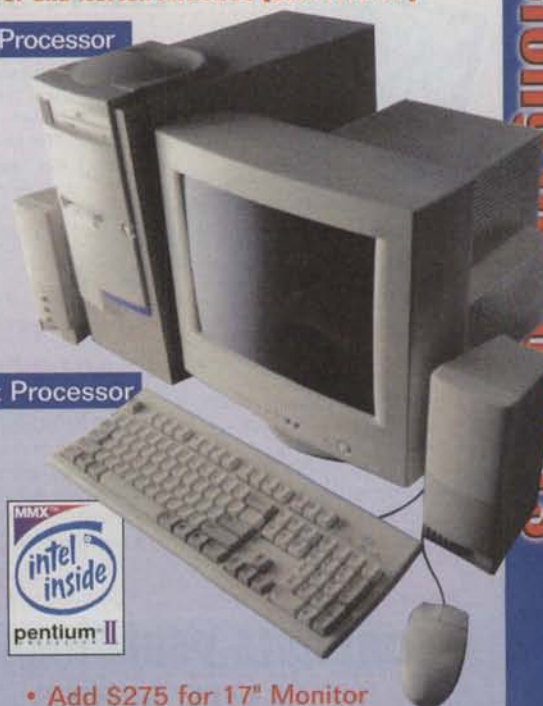
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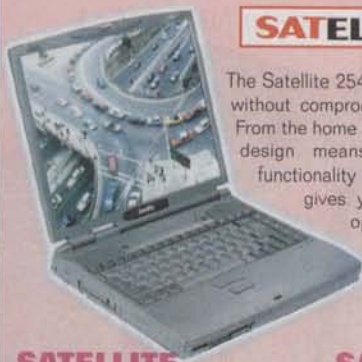
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- ◆ 64MB high performance Synchronous DRAM, expandable to 192MB
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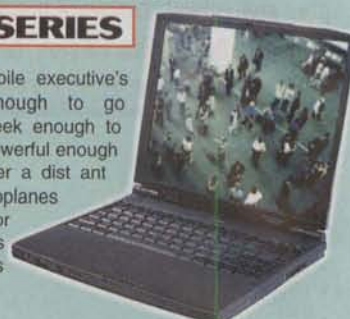
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- ◆ 4Gb hard disk drive
- ◆ Optional Port Replicator
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- ◆ 64MB high performance Synchronous DRAM, expandable to 192MB
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- ◆ 13.3" TFT active matrix colour display
- ◆ 64MB high performance Synchronous DRAM, expandable to 192MB
- ◆ Windows® 98

NBTOS054 **\$7,155**

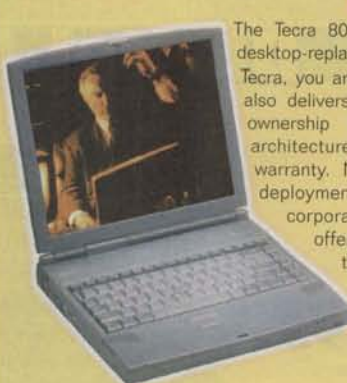
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- ◆ Optional PCMCIA CD-ROM Drive (\$350)
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- ◆ 32MB high performance Synchronous DRAM, expandable to 96MB
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- ◆ 24X max. speed CD-ROM
- ◆ 10Gb hard disk drive
- ◆ Optional Port Replicator
- ◆ 13.3" 1024 x 768 TFT active matrix colour display
- ◆ 64MB high performance Synchronous DRAM, expandable to 192MB
- ◆ Windows® 98

NBTOS052 **\$7,725**

TECRA 8000 CEL 333

- ◆ Intel® Celeron processor, 333MHz
- ◆ Integrated design with built-in diskette drive
- ◆ 24X max. speed CD-ROM
- ◆ 6.4Gb hard disk drive
- ◆ Optional Port Replicator
- ◆ 13.3" 1024 x 768 TFT active matrix colour display
- ◆ 64MB high performance Synchronous DRAM, expandable to 192MB
- ◆ Windows® 98

NBTOS057 **\$5,245**

Notebooks

Twinhead



Slimnote-VX

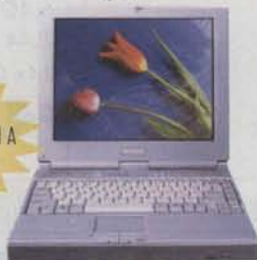
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| Model | VX P86T | V33T | GX P98T |
|----------------|------------------|-------------------|-------------------|
| Processor | Celeron 266Mhz | Pentium II 333Mhz | Pentium II 300Mhz |
| Memory | 32MB SODIMM | 64MB SODIMM | 64MB SODIMM |
| Hard Drive | 3.2GB HDD | 4GB HDD | 6GB HDD |
| CD-ROM | 24X Speed | 24X Speed | 24X Speed |
| Video RAM | 2MB Graphics | 2MB Graphics | 2MB Graphics |
| Audio | 16-bit SoundCard | 16-bit SoundCard | 16-bit SoundCard |
| Screen | 12.1" TFT | 13.3" TFT | 14.4" TFT |
| Battery | Ni-MH | Li-Ion | Li-Ion |
| OS | Windows 98 | Windows 98 | Windows 98 |
| | \$3,095 | \$4,375 | \$4,675 |
| | NBTW003 | NBTW004 | NBTW005 |
| Rent per week* | \$28.15 | \$39.80 | \$42 |



BONUS:
ALL NOTEBOOKS COME WITH A
FREE CARRY CASE



Power Slim

The Power Slim is the lightest and most powerful notebook available today. Its compactness is a must for those who wish to travel light with plenty of power to spare.

Specifications

| Model | PowerSlim P90 |
|----------------|------------------|
| Processor | Pentium 300MMX |
| Memory | 32MB SODIMM |
| Hard Drive | 3GB HDD |
| CD-ROM | 24X Speed |
| Video RAM | 2MB Graphics |
| Audio | 16-bit SoundCard |
| Screen | 12.1" TFT |
| Battery | Li-Ion |
| OS | Windows 98 |
| | \$3,995 |
| | NBTW006 |
| Rent per week* | \$36.25 |

BONUS: A free 56K
Fax/Modem & Ethernet
combo PCMCIA card with each
PowerSlim notebook sold.



* Based on a 36 month rental

Adelong Computers

COMPAQ

Notebooks



COMPAQ ARMADA 1500C

The perfect entry level notebook combines a blend of power, multimedia capabilities & performance for the value conscious customer.

- Intel Celeron 300A Processor
- 32MB SDRAM (160MB MAX)
- 4GB Ultra ATA Hard Drive
- 24X CD-ROM Drive
- 2MB Graphics Accelerator
- Software MPEG-1 Playback
- 12.1" TFT Screen
- 16Bit SoundCard
- Windows 95
- 1 Year International Warranty

\$2945 or \$27.25 per week**
NBCOM003



COMPAQ PRESARIO 1660

Loaded with
multimedia
features found only on

higher end desktops the Presario is the perfect partner for those users who want lighting fast graphics, CD-ROM and DVD capabilities and mind boggling audio. Perfect for presentations.

- Intel Pentium II 300Mhz Processor
- 128MB SDRAM
- 4GB Ultra ATA Hard Drive
- 2X DVD-ROM Drive
- 2.5MB 3D AGP Graphics Accelerator
- 13.3" TFT Screen
- JBL Pro Audio System
- 56K Fax/Modem
- Windows 98
- 1 Year International Warranty

\$5375 or \$45 per week**
NBCOM011



COMPAQ ARMADA 1750

Never has there been such a great combination of features and convenience. Flexibility is assured with the integrated MultiBay which can take on options such as a zip drive or second hard disk. The new highly durable design includes Compaq's spill-resistant keyboard and a shock-resistant hard drive for ultimate on-the-road durability.

- Intel Mobile Pentium II 300Mhz
- 64MB SDRAM
- 4GB Ultra ATA Hard Drive
- 24X CD-ROM Drive
- 4MB SGRAM Graphics
- 13.3" TFT Screen
- 16-Bit SoundCard
- 56K Fax/Modem
- Windows 95
- 1 Year International Warranty

\$3995 or \$36.25 per week**
NBCOM005

* Based on a 36 month rental

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olympic
TECHNOLOGY

Notebooks

POWER, PERFORMANCE & AFFORDABILITY

Thanks to Olympic Technology, now there are no limits to how far you can go.



Olympic Note-266

Intel Pentium 266MMX Processor
12.1" SVGA TFT (800x 600)
512k L2 Cache
32Mb SDRAM (exp. To 128Mb)
2Mb Video Memory
Built-in Yamaha 3D Audio
4.3Gb Hard Drive
1.44 Fdd
24x CD-ROM

\$2,675 NBOLY001

Olympic Note-520i

Intel Pentium II 300 Processor
12.1" SVGA TFT (800x 600)
512k L2 Cache
64Mb SDRAM (exp. To 128Mb)
4Mb Video Memory
Built-in Wavetable 3D Audio
6.4Gb Hard Drive
1.44 Fdd
24x CD-ROM

\$3,295 NBOLY002

Olympic Note-300P

Intel Pentium 266Mxx Processor
14.1" SVGA TFT (800x 600)
512k L2 Cache
32Mb SDRAM (exp. To 128Mb)
4Mb Video Memory
Built-in Wvetable 3D Audio
6.4Gb Hard Drive
1.44 Fdd
24x CD-ROM

\$4,199 NBOLY003

All Olympic Notebooks come with Carry Case, Lithium Ion Battery pack, AC Adaptor and Windows 98

GIGABYTE

Mainboards

Dual BIOS

Gigabyte Technology is pleased to introduce DualBIOS, a "hot spare" for your system bios. In the event that your primary BIOS fails the second BIOS backs you up almost automatically. A feature found in the GA-BX2000, GA-6GXU & GA-6GXDW boards.

GA-BX2000

- Intel BX Chipset
- Support Intel Pentium II/III & Celeron Processors
- Slot 1 with AGP slot
- Supports 66/75/83/100/112/133Mhz System BUS
- Clock Multiplier 3.0 - 6.5X
- 4 DIMM sockets to 1GB DRAM
- 5 x PCI, 1x AGP, 2 x ISA Expansion slots
- ATX Form Factor with USB
- Includes DualBIOS technology



\$259 MBGIG024

GA-5AX

- ALI - Aladdin V AGPset
- Support AMD K6 III Processor, Intel Pentium MMX
- Socket 7 Processors from
- Supports 66/75/83/95/100/115/120Mhz System BUS
- 512KB Cache onboard
- 3 DIMM sockets to 768MB DRAM
- 4 x PCI, 1x AGP, 2 x ISA Expansion slots
- ATX Form Factor with USB



Support
AMD K6-3

\$149 MBGIG025

GA-6GXU

- Intel GX Chipset, Slot 2
- Supports Intel XEON processors
- Supports 100/112/124/133Mhz System BUS
- Adaptec 7890 Ultra 2 SCSI onboard
- 4 DIMM sockets to 2GB DRAM
- 4 x PCI, 1x AGP, 3 x ISA Expansion slots
- Includes DualBIOS technology



SCSI

\$999 MBGIG026

GA-6GXDW

- Intel GX Chipset, Slot 2
- Supports DUAL Intel XEON processors
- Supports 100/112/124/133Mhz System BUS
- Adaptec 7890 Dual Channel Ultra 2 SCSI onboard
- 4 DIMM sockets to 2GB DRAM
- 6 x PCI, 1x AGP, 1 x ISA Expansion slots
- Includes DualBIOS technology



Dual
SCSI

\$1495 MBGIG027

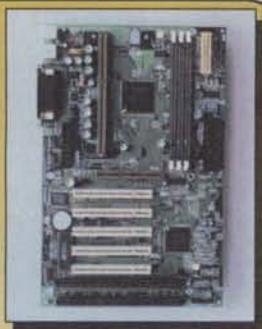
Mainboards



Adelong Computers

AOpen AX6BC Mainboard

Introducing the AOpen AX6BC Mainboard featuring the Intel BX Chipset. A unique jumperless design, CPU monitoring & protection circuitry combines ease of use with reliability and performance. Winner of many international awards you can be sure that the AX6BC Mainboard will work with you, not against you.



- Supports Intel Pentium II 233 - 450Mhz, Pentium III & Celeron Processors,
- 5 x PCI, 2 x ISA, 1 x AGPx2 Expansion slots
- 768MB SDRAM for 3 x DIMM slots
- 2 x Serial, 1 x Parallel, 2 x USB Ports
- 2 x EIDE Controller & ATX Form Factor
- Supports Wake on LAN, DMI, SB-LINK

Pentium III Ready

\$225

MBACE000

AOpen AX63 Pentium II Mainboard

The AOpen AX63 Mainboard brings true computing performance at a very affordable price. Powered by the advanced VIA Apollo Pro Plus AGP chipset the AX63 Mainboard supports technologies such as Jumperless design, Resettable Fuse for USB & K/B, BIOS flash protection and CPU protection.



- Supports Intel Pentium II 233 - 450Mhz, Pentium III & Celeron Processors
- 5 x PCI, 2 x ISA, 1 x AGPx2 Expansion slots
- 768MB SDRAM for 3 x DIMM slots
- 2 x Serial, 1 x Parallel, 2 x USB Ports
- 2 x EIDE Controller & ATX Form Factor3

Pentium III Ready

\$185

MBACE002

AOpen AX6B Plus Mainboard

Building on the quality & performance of the AX6BC Mainboard the new AOpen AX6B comes standard with an Adaptec 7880P Ultra Wide SCSI Controller (onboard). An excellent choice for mid range servers and workstations where speed is a must!



- Supports Intel Pentium II 233 - 450Mhz, Pentium III & Celeron Processors
- 4 x PCI, 3 x ISA, 1 x AGPx2 Expansion slots
- 768MB SDRAM for 3 x DIMM slots
- 2 x Serial, 1 x Parallel, 2 x USB Ports
- SCSI on board - Adaptec 7880P SCSI Controller With 68pin U/W & 50pin Ultra SCSI connectors
- 2 x EIDE Controller & ATX Form Factor
- Supports Wake on LAN, DMI, SB-LINK

Pentium III Ready

\$495

MBACE001

AOpen AOpen AX3L Celeron Mainboard

The AOpen AX3L supports the latest generation of Intel Celeron socket 370 (PPGA) Processors. Featuring an ESS Solo 1 PCI Soundcard the AX3L Mainboard provides an excellent computing platform on which to build.



- Supports Intel Celeron 300A - 433Mhz
- 4 x PCI, 2 x ISA, 1 x AGPx2 Expansion slots
- 384MB SDRAM for 3 x DIMM slots
- 2 x Serial, 1 x Parallel, 2 x USB Ports
- 2 x EIDE Controller & ATX Form Factor

BONUS
Norton AntiVirus
With All AOpen Mainboards

\$195

MBACE003

AOpen EIDE CD-ROM

- ATAPI IDE CD-ROM
- Ultra DMA Supported
- 512Kbytes buffer
- Compatible with CD-DA, CD-ROM/XA, CD-I/MPEG, Photo CD, Karaoke CD, CD, CD-RW, Packet write
- Audio Extraction

BONUS
Norton AntiVirus

AOpen CD-948E

MAX Transfer Rate 7200KB/sec with 48X

48X CD-ROM

\$119

MMACE001

AOpen CD-940E

MAX Transfer Rate 6000KB/sec with 40X

40X CD-ROM

\$95

MMACE000



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Processor



Intel Pentium III Processor

The Pentium III processor at 550, 500 and 450 MHz extends processing power further by offering performance headroom for business media and Internet capabilities. With Streaming SIMD Extensions - 70 new instructions to speed up Graphics, Multimedia, 3D gaming and Streaming video applications, be ahead with the Pentium III.

NEW

| Code | Model | Price |
|----------|--------------------------|--------|
| CPINT027 | Intel Pentium III 450Mhz | \$595 |
| CPINT028 | Intel Pentium III 500Mhz | \$1095 |
| CPINT031 | Intel Pentium III 550Mhz | \$1545 |

Intel Pentium II Processor

The Pentium II Processor provides an extensive array of computing power for all your applications no matter how demanding.

PRICE DROP

| Code | Model | Price |
|----------|-----------------------------------|-------|
| CPINT016 | Pentium II 400Mhz with 512K Cache | \$465 |

Intel Celeron Processor PPGA

The Intel Celeron Processor for desktop computing provides you with the performance to handle today's most common applications at an exceptional price. Compatible with Socket 370 PPGA Mainboards.

| Code | Model | Price |
|----------|---------------------|-------|
| CPINT024 | Celeron 366Mhz PPGA | \$165 |
| CPINT026 | Celeron 400Mhz PPGA | \$229 |
| CPINT029 | Celeron 433Mhz PPGA | \$315 |
| CPINT030 | Celeron 466Mhz PPGA | \$375 |



AMD K6-3 Processors

Hyper-Realistic Multimedia & Explosive Performance with AMD K6-III Processor.

PRICE DROP

| Code | Model | Price |
|----------|--------------|-------|
| CPAMD016 | AMD K6-3 400 | \$415 |
| CPAMD017 | AMD K6-3 450 | \$495 |

AMD K6-2 Processors

Ultra quick & priced affordably for the home or office

| Code | Model | Price |
|----------|--------------|-------|
| CPAMD010 | AMD K6-2 350 | \$139 |
| CPAMD014 | AMD K6-2 400 | \$189 |
| CPAMD018 | AMD K6-2 450 | \$259 |



CYRIX M2 Processors

| Code | Model | Price |
|----------|-----------|-------|
| CPIBM008 | M2-300MHZ | \$80 |
| CPIBM009 | M2-333MHZ | \$105 |

Heatsink and Fan

| Code | Model | Price |
|----------|------------------|-------|
| MSADE006 | Socket 7 CPU FAN | \$15 |

Memory

SDRAM - 64-Bit, 168 pin Memory for use with Pentium System using Intel TX/LX/BX/ZX Chipsets. PC-100 RAM is compatible with 66Mhz & 100Mhz bus speeds.

ECC Memory extends to provide error checking & correction and ideal for servers and mission critical systems.

| Code | Model | Price |
|----------|-----------------------|-------|
| RAGEN008 | 32MB PC66 SDRAM | \$70 |
| RAGEN024 | 32MB PC100 SDRAM | \$75 |
| RAGEN022 | 64MB PC100 SDRAM | \$145 |
| RAGEN023 | 128MB PC100 SDRAM | \$235 |
| RAGEN025 | 256MB PC100 SDRAM | \$795 |
| RAGEN026 | 128MB ECC PC100 SDRAM | \$349 |

EDO RAM - For use in 486 systems and most Pentium & Pentium Pro type systems. Used in Pairs in Pentium system.

| Code | Model | Price |
|----------|---------------------|-------|
| RAGEN005 | 16MB EDO SIMM 72Pin | \$69 |
| RAGEN006 | 32MB EDO SIMM 72Pin | \$130 |

FAST PAGE RAM - For use in older 486, Pentium systems and some printers. Used in pairs in Pentiums.

| Code | Model | Price |
|----------|-----------------|-------|
| RAGEN002 | 16MB SIMM 72Pin | \$75 |
| RAGEN003 | 32MB SIMM 72Pin | \$139 |

Hard Drives



Adelong Computers



EIDE Drives Sporting the industry's first Ultra ATA/66 high speed data transfer feature, the new Caviar drives feature a maximum transfer rate of 66Mb/s. That's double the speed of its nearest rival. All Western Digital Caviar drives undergo 200 rigorous tests before shipping to ensure compatibility and reliability with all your existing hardware and software applications.

| Code | Model | Size (GB) | Transfer Rate | Price |
|----------|----------|-----------|---------------|-------|
| HDWES002 | AC14300 | 4.3GB | 66Mb/s | \$225 |
| HDWES003 | AC25400 | 6.4GB | 66Mb/s | \$265 |
| HDWES004 | AC28400 | 8.4GB | 66Mb/s | \$285 |
| HDWES005 | AC310200 | 10.2GB | 66Mb/s | \$335 |
| HDWES006 | AC313000 | 13.1GB | 66Mb/s | \$385 |
| HDWES007 | AC420400 | 20 GB | 66Mb/s | \$655 |

* 1Gb = 1 Billion bytes



The Data Lifeguard feature is in every Western Digital hard drive. Data Lifeguard protects end user data by automatically detecting, isolating and repairing possible problem areas before data loss can occur. This new feature is always enabled and works independently preventing possible system down time by warning the user of the impending risk of Hard Drive failure. This represents Western Digital's ongoing commitment to data protection.



Protecting your Computer and peripherals.



\$285
PSPKE000

BlackoutBuster (500 VA)
Is a UPS that has all the features to satisfy all your needs. Protects a standard PC for up to 25 mins.



Add the **Powerpack**
For increasing the power capacitor backup time of the system.
One powerpack doubles the BlackoutBusters power. Doubles backup time to 50 mins.



Emergency backup battery



Voltage protection



Power Surge protection



Internet line protection



Smartpack
Adding Smartpack allows BlackoutBuster to be monitored and controlled by a computer.



MicroPack
This is an attachment for automatic shutdown of Windows, OS/2 and Novell network operating systems.

| Code | Model | Price |
|----------|---------------------------------------|-------|
| PSPKE000 | Blackout Buster 500VA | \$285 |
| PSPKE001 | Smartpack | \$165 |
| PSPKE002 | Micropack | \$65 |
| PSPKE003 | Powerpack 500VA | \$270 |
| PSPKE004 | Blackout Buster 1000VA with Smartpack | \$690 |

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Hard Drives

High performance disk solutions from Seagate catering for:  **Seagate**

- High end multimedia & video applications (A/V)
- High performance workstations, servers and super computers
- Graphics and 3D Applications
- Internet/Intranet based web servers



Seagate Medalist Pro

Cost effective, high performance SCSI hard drives with 512K cache and a spindle speed of 7200RPM.

| Code | Model | Capacity | Interface | Tr/Rate | Price |
|----------|----------|----------|-----------------|---------|-------|
| HDSGT025 | ST36530N | 6.4GB | Ultra SCSI | 20Mbps | \$575 |
| HDSGT026 | ST36530W | 6.4GB | Ultra Wide SCSI | 40Mbps | \$575 |



Seagate Barracuda

High Capacity, ultra high performance SCSI Hard Drives with a seek time of 7ms and a spindle speed of 7200RPM.

| Code | Model | Capacity | Interface | Tr/Rate | Price |
|----------|------------|----------|-----------------|---------|--------|
| HDSGT014 | ST39173W | 9.1GB | Ultra Wide SCSI | 40Mbps | \$895 |
| HDSGT027 | ST39173LC | 9.1GB | LVD 80 Pin | 80Mbps | \$895 |
| HDSGT028 | ST39173LW | 9.1GB | LVD 68 Pin | 80Mbps | \$895 |
| HDSGT036 | ST39173FC | 9.1GB | Fibre Channel | 100Mbps | \$895 |
| HDSGT023 | ST118273W | 18GB | Ultra Wide SCSI | 40Mbps | \$1575 |
| HDSGT029 | ST118273LC | 18GB | LVD 80 Pin | 80Mbps | \$1575 |
| HDSGT030 | ST118273LW | 18GB | LVD 68 Pin | 80Mbps | \$1575 |
| HDSGT037 | ST118273FC | 18GB | Fibre Channel | 100Mbps | \$1575 |



Seagate Cheetah

Ultimate Performance for servers and high-powered workstations. Features an industry leading 10,000 RPM spindle speed & a cache buffer of 512K.

| Code | Model | Capacity | Interface | Tr/Rate | Price |
|----------|------------|----------|---------------|---------|--------|
| HDSGT031 | ST39102LC | 9.1GB | LVD 80 Pin | 80Mbps | \$1245 |
| HDSGT032 | ST39102LW | 9.1GB | LVD 68 Pin | 80Mbps | \$1245 |
| HDSGT035 | ST39102FC | 9.1GB | Fibre Channel | 100Mbps | \$1245 |
| HDSGT033 | ST118202LC | 18GB | LVD 80 Pin | 80Mbps | \$2125 |
| HDSGT034 | ST118202LW | 18GB | LVD 68 Pin | 80Mbps | \$2125 |
| HDSGT038 | ST118202FC | 18GB | Fibre Channel | 100Mbps | \$2125 |

LVD: Low Voltage Differential Drives are for use with Ultra 2 SCSI Controllers such as the Adaptec 2940U2W Controller giving you a transfer rate of 80Mbps. Backwards compatible with Ultra & Ultra Wide SCSI Controllers.

IBM Hard Drives



TravelStar 2.5" IDE Drives

Experience blistering performance on a notebook computer. The IBM range of TravelStar IDE drives feature 512K of cache accessed via an Ultra ATA interface. Compatible with all notebook & laptop computers.

LAPTOP DRIVES

| Code | Capacity | Seek Time | Tr/Rate | Price |
|----------|----------|-----------|---------|-------|
| HDIBM002 | 3.2GB | 13ms | 33Mb/s | \$335 |
| HDIBM025 | 4.8GB | 12ms | 33Mb/s | \$355 |
| HDIBM026 | 5.4GB | 12ms | 33Mb/s | \$485 |
| HDIBM027 | 6.4GB | 12ms | 33Mb/s | \$535 |

UltraStar 3.5" SCSI Drives

Quality, performance at a reasonable price is what the IBM UltraStar range of hard drives offer. Featuring a seek time of 7.5ms, cache size of 512K and a spindle speed of 7200 RPM be sure that the UltraStar range of drives will give you sizzling performance that won't break the bank!

| Code | Capacity | Interface | Tr/Rate | Price |
|----------|----------|-----------------|---------|-------|
| HDIBM010 | 4.5GB | Ultra Wide SCSI | 40Mb/s | \$455 |
| HDIBM012 | 9.1GB | Ultra Wide SCSI | 40Mb/s | \$735 |

Quantum Hard Drives



The new Quantum CR EIDE Hard Drives feature the new ATA4 Ultra/66 Interface enabling a transfer rate of 66Mb/s with supporting controllers. Other features 512Kb of Buffer and an internal transfer rate of 190Mb/s.

| Code | Capacity | Seek Time | Spindle Speed | Tr/Rate | Price |
|----------|----------|-----------|---------------|---------|-------|
| HDQTM042 | 4.3GB | 9.5ms | 5400RPM | 66Mb/s | \$235 |
| HDQTM043 | 6.4GB | 9.5ms | 5400RPM | 66Mb/s | \$275 |
| HDQTM044 | 8.4GB | 9.5ms | 5400RPM | 66Mb/s | \$299 |
| HDQTM045 | 12.7GB | 9.5ms | 5400RPM | 66Mb/s | \$445 |

**ULTRA
ATA**



Weapon...Viper V770

Wreak Havoc with the Ultimate 3D

Viper V770 from Diamond features 32MB memory and 128-bit power for fierce 3D and 2D graphics performance. Based on the NVIDIA RIVA TNT2 - with the latest 3D technology, AGP 4X support, and full optimization for Windows 95/98 and Windows NT 4.0 - Viper V770 is the ultimate solution for unrivaled graphics performance. Viper V770 Ultra goes further to include a tweaked hardware design for the fastest gaming solution on earth.

32MB AGP
\$360
DCDIA026

32MB ULTRA
\$490
DCDIA027

www.diamondmm.com.au



Viper V550

The Viper V550 from Diamond features unprecedented 128-bit power for the state-of-the-art 2D graphics and stunning 3D quality for high-speed game play, business and professional graphics. Fully optimised for Windows 98, Viper V550 is the next generation in high performance graphics acceleration. Available in PCI and AGP 2X configurations

- Featuring 16MB of SDRAM
- 128-bit dual processor architecture
- Accelerates OpenGL and DirectX
- Supports software DVD

DCDIA016 **\$249** PCI
DCDIA018 **\$269** AGP
DCDIA017 **\$209** AGPOEM

16MB

NEW 8MB V550 AGP \$139
DCDIA022



Latest 3D Technology

The New Generation of Stealth is Here. With up to a huge 16MB of graphics memory, and AGP 2X/4X power, Diamond's new Stealth III series will deliver cutting edge games and application performance at affordable prices.

- Features up to 16MB of graphics memory
- Supports resolutions up to 1920 x 1440
- AGP 2X or 4X (depending on model)

16MB AGP
\$209
MMDIA024

32MB AGP
\$249
MMDIA025

Monster Sound MX300 Ultimate 3D Audio Experience!!!

Want to annihilate your opponents every time? Diamond's Monster Sound MX300 gives you awesome combat tools: Aureal's latest A3D 2.0 positional audio, 4-speaker support and 64-voice hardware wavetable synthesis. Imagine playing your favourite PC game hearing footsteps from behind you and gun shots from overhead. Monster Sound MX300 delivers unbelievable 3D effects to give you the unfair advantage.



- Hardware A3D 2.0 acceleration
- 9.6 audio systems
- Features Dolby Digital (AC-3) support
- Advanced 320-voice wavetable with support for downloadable samples
- Supports DOS and Windows games

MMDIA011 **\$175** RETAIL
MMDIA013 **\$135** OEM

Rio PMP300 Internet Music in the Palm of Your Hand!

The first portable MP3 music player that stores up to 60 minutes of digital quality sound. Load the latest songs on to Rio directly from your Hard Drive, personal CD's or the Internet and carry them with you. It's smaller than an audio cassette and has no moving parts, so it never skips. Powered by a single AA battery, Rio provides up to 12 hours of continuous music playback.

- Lightweight - only 70 grams
- Palm size for easy portability
- 32MB built-in flash memory



MMDIA012 **\$359**
16MB Flash Memory Card \$129 MMDIA014

Sonic Impact S90 Hot 3D Wavetable Audio!

Diamond's Sonic Impact S90 uses advanced A3D technology to bring life-like positional 3D game play to your PC. Sonic Impact S90 includes hardware acceleration for 64 wavetable voices and Aureal's A3D to immerse you in the middle of the action. Add realistic atmospheric effects, including fog and underwater sounds, and you have total audio transformation for your PC.



- PCI design for faster system performance
- Supports downloadable samples
- Runs with DOS, Win95/98, Win NT 4.0

MMDIA010 **\$110** RETAIL
MMDIA008 **\$59** OEM

PRICE DROP

HomeFree

Easy Wireless Networking!



No holes! No cables! HomeFree delivers 1MB wireless links for up to 16 PCs, 45 meters apart. Includes point-and-click network setup, software for shared Internet access, all at an incredible price. Windows 95/98 only.

- Frequency hopping for maximum security
- 45-metre range
- Each kit contains 2 nodes

Desktop to Desktop
\$399
NWDIA000

Desktop to Notebook
\$449
NWDIA001

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RIVA TNT 2

The Magic TNT2 use the nVIDIA RIVA TNT2, the fastest, the only true 128 bit 2D/3D chipset supporting 2nd generation Twin-Texel in single pass and 32 bit color, 32 bit Z-buffer rendering and support high resolution 1,920 x 1,200 @75Hz. With 150Mhz, 32MB SGRAM memory, 300Mhz RAMDAC, Magic TNT2 can deliver 300Mpixel/sec fill rate, 9M million triangles/sec peak, massive 2.9GB/sec frame buffer bandwidth.



features 32 bit rendering, 32 bit Z-buffer DVD/MPEG-2 software player, and TV out 128 Bit 2nd generation Twin-Texel(TNT) High performance 128 Bit 2D acceleration. Video acceleration for 30fps full screen DVD playback.

32Mb AGP 32Mb AGP/TV out
\$335 **\$360**
DCMAG017 DCMAG018

3DFX Voodoo 3

The Voodoo3 family of boards deliver the ultimate in 3D and 2D performance, while supporting the new generation of ultra-high resolution displays. They are designed for consumers and game enthusiasts seeking the most compelling entertainment experience available on a PC.

Voodoo 3 2000

- 16MB SDRAM AGPx2
- 143Mhz Core Clock Speed
- 300Mhz RAMDAC
- Resolution up to 2048 x 1536
- Hardware Assisted DVD

PCI AGP
\$325 **\$389**
DCMAG006 DCMAG007

Voodoo 3 3000

- 16MB SDRAM AGPx2
- 166Mhz Core Clock Speed
- 350Mhz RAMDAC
- Resolution up to 2048 x 1536
- Hardware Assisted DVD
- TV/S-Video Output
- 100 Billion operations per second

\$448
DCMAG008

MAGIC TNT 2D/3D

The most versatile high-end graphics accelerator on the market today utilizing the nRIVA TNT Chipset. The awesome speed and color depth of the Magic TNT will amaze gamers, while multimedia users will love the high resolution (1920 x 1200 @32bit color) and super-fast redraw capabilities of the Magic TNT.



- 16MB 128-bit SDRAM
- 250Mhz RAMDAC
- Optimized Direct3D Acceleration & OpenGL support
- Software DVD support
- AGPx2

\$164
DCMAG003
With TV Output **\$180**
DCMAG012

MAGIC 3D Voodoo2

The Magic 3D II utilizing the 3DFX Voodoo2 offers a totally mind-blowing 3D gaming experience. Play games at the fastest frame rates and colors - an experience just like the arcades. Requires an existing Graphics Card either PCI or AGP and an empty PCI slot.



- 12MB Memory 100Mhz DRAM
- Supports 3DFX Glide, Direct3D, OpenGL
- SLI Capable

\$172
DCMAG000

S3 TRIO 3D 2x AGP

For the ideal entry level 2D/3D graphics accelerator look no further than the S3 Trio3D. Featuring a 128-bit graphics engine and 230Mhz RAMDAC the Trio3D is able to support high quality video and games.



- 2 x 133Mhz
- 4MB 100Mhz SGRAM
- 1280 x 1024 x 16Million Colors
- 1600 x 1200 x 64k colours
- Enhanced S3 stream Processor technology for hardware assisted video playback
- AGP

\$45
DCMAG005

MAGIC 3D BANSHEE

The Magic TwinPower incorporating the latest 3DFX Voodoo Banshee chipset is one of the fastest and most amazingly fast 2D/3D Graphics Accelerator on the market today. Play games at up to 60 fps and run high resolution games/applications at up to 1600 x 1200 with hardware acceleration.



- 128-bit combined 2D/3D Voodoo Banshee chipset
- 16MB Memory with 125Mhz SGRAM
- Supports Glide, OpenGL, DirectX, Direct3D
- NT 4.0 & Windows 95/98 compatible

\$165 PCI **\$165** AGP
DCMAG001 DCMAG002

MAGIC TV



NEW

Watch full screen TV on your PC with the FlyVideo TV Card. Capture live video & images from your VCR or Camcorder, or use a CCD Camera and video-conference over a LAN or Internet. Plug and Play installation makes configuration an ease whilst a handy remote control will give you a truly relaxing experience. Comes standard with teletext and with the optional FM version it even allows you to listen to the radio on your computer.

HOT

MMMAG000 **\$105** TV Card

MMMAG002 **\$130** TV Card/Remote/FM Radio

Graphics Cards



Adelong Computers

POWERED BY



The Millennium G400 Series

A powerhouse of breakthrough technologies and next-generation features, the Millennium G400 Series of graphics boards are outfitted with Matrox's unique DualHead Display feature, built-in support for true Microsoft® DirectX™ 6 Environment-Mapped Bump Mapping and trademark Vibrant Color Quality² rendering. It is these unequaled, must-have features which not only distinguish them from all other graphics solutions, but which revolutionizes the way you use computers.

The Millennium G400

Fitted with 16 or 32MB of fixed, high-speed SGRAM, the Millennium G400 provides lightning fast, ultra-crisp displays with its 300 MHz RAMDAC, while at the same time delivering stunningly realistic image quality in the most demanding business and home applications without compromising performance.

G400 16MB AGP
\$330 DCMAT033

G400 32MB AGP
\$435 DCMAT034

The Millennium G400 MAX

The Millennium G400 MAX is fitted with a fixed 32MB of high-bandwidth SGRAM and is supercharged with a 360 MHz UltraSharp RAMDAC capable of driving high-end monitors at resolutions of up to 2048 x 1536, 32-bpp at 85Hz. Targeted directly at the accept-no-compromise PC gamer and at professionals who require an exceptionally large desktop display, the Millennium G400 MAX slams the performance gear into overdrive with an increase in raw speed of more than 30 per cent over the Millennium G400.

G400 MAX32MB AGP
\$495 DCMAT035



CREATIVE Sound Cards

SoundBlaster Live!256

SoundBlaster Live! offers simultaneous record and play functions, making it possible to do "multi-track" recording. Recording from digital input via SPDIF is now possible. SoundBlaster Live! Offers all features of the Live!256 Value including extras such as:

- Gold Plated RCA for Speaker output
- 20 Bit S/PDIF Digital I/O for Digital Input & Output
- Includes professional editing software such as SoundForge & Cakewalk

\$495
MMCRE028



SoundBlaster Live!256 Value

Experience the most powerful sound card ever! Sound Blaster Live! introduces a new dimension of audio by including features and performance surpassing professional Hollywood-quality audio equipment. With real-time audio enhancement, enjoy live concert-like music productions so dynamic, you'll feel like you're right in the middle of an orchestra.

- Advanced EMU10K1 Audio Accelerator processing signals at 48Khz
- 256-voice capabilities delivers richer sound quality through 4 Speakers
- Use up to 32MB of your system RAM to store your samples as SoundFont technology
- Patent Environmental Audio enhances existing content using DSP
- Environmental Extensions™ for incorporating 3D environmental effects into titles

Retail
\$265

MMCRE031

OEM
\$155

MMCRE038



LIMITED OFFER
Get the SoundBlaster Live!256 Value and the PCWorks Speaker System together at this special price

\$265*
MMCRE037

Cambridge PCWorks

Experience Home Stereo Sound on your PC at an Astonishingly low price with this subwoofer-satellite combination.

- Satellite power 7Watts RMS
- Subwoofer power 10Watts RMS
- Magnetically shielded speakers can be placed next to monitors or TVs without interference.



\$189
MMCRE020

* whilst stocks last

Sales staff are available (est) 9am-6pm Monday to Friday, 10am-4pm Saturday
Technical Support (5 Days a week 9am-6pm) Phone (02) 8344 3160

Sales Hotline 02 8344 3190

15



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Speakers

ADA305 DIGITAL POWERCUBE

The ADA305 Digital PowerCube delivers multidimensional audio excitement resulting from a Dolby Pro Logic decoder in the subwoofer. To deliver the multichannel audio, the Digital PowerCube uses Altec Lansing's patented side-firing speakers so that the audio is driven to the side and rear for a true multidimensional audio experience.

- 20 Watts RMS Satellite Speakers
- 2 x 3" full range drivers
- 6" Subwoofer
- USB ready
- Frequency Response 20Hz - 20KHz

5 CHANNEL
DIGITAL
PROLOGIC



MMAL006 **\$395**

ADA70 ALTEC LANSING

USB allows multimedia audio to enter the digital domain so that you can experience real-life sound reproduction via your personal computer. The ADA70 is a 3 piece system with USB connection for the most realistic audio playback you can experience from your personal computer. Great for CDs and multimedia.

- ADA 70 Digital USB Speaker
- 3" Full Range Driver & 1" Dome Tweeter
- 14 Watt RMS Satellite Speakers
- 6.5" Dual Voice Coil Woofer
- 20 Watt RMS Subwoofer
- Frequency Response 35Hz



DIGITAL

MMAL007 **\$295**

ACS48 POWERCUBE PLUS SPEAKER SYSTEM

The PowerCube Speaker System, from Altec Lansing is the markets leading affordable audiophile multimedia audio solution for the home or office. Comprising of a 3 unit system, allows you to experience hi-fi quality audio from your CDs, games or the Internet. In addition, the Powercube Plus 6" subwoofer is encased in wood, offering you a deeper low frequency response.

- 20 Watts RMS Satellite Speakers
- 3" full range driver
- 3/4" high frequency driver
- 40 Watts RMS, 6" subwoofer
- frequency response 35Hz - 20 KHz



MMAL003 **\$285**

ACS45 POWERCUBE SPEAKER

Introducing the Altec Lansing ACS45 PowerCube Speakers, a three piece multimedia audio solution at an unbelievable price. Experience the enhanced output of the PowerCube satellite system. Great for games and CD's, the ACS45 will bring hi-fi audio to your computer desktop today.

- 6 Watts RMS Satellite Speakers
- 3" full range driver
- 20 Watts RMS, 6" subwoofer
- frequency response 35Hz - 20 KHz

BEST
Speaker
under
\$200



MMAL001 **\$195**

Graphics Card

All Voodoo3 Cards Support

- 32 bit internal rendering
- full 128-bit 2D accelerator
- DVD hardware assist
- DirectX®, Glide® and OpenGL®

Voodoo3 3500 Quake II time demo benchmark

106fps at 800x600
84fps at 1024x768
35 fps at 1600x1200.

3dfx™



AGP **\$389**
DC3DF000

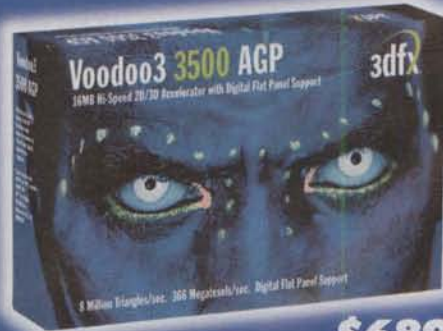
Industry-Leading Performance
The 143MHz Voodoo3 2000 AGP and PCI boards are expected to generate up to 6 million triangles and 286 Megatexels per second at resolutions of up to 2,048 by 1,536 pixels. The Voodoo3 2000 boards will feature a 300MHz RAMDAC and 16MB of SDRAM.

PCI **\$389**
DC3DF001



\$489
DC3DF002

The 166MHz Voodoo3 3000 AGP board is expected to generate 7 million triangles and 333 Megatexels per second at resolutions of up to 2,048 by 1,536 pixels. Features a 350MHz RAMDAC, TV/S-Video Out capabilities as well as a game bundle featuring best-selling titles. The Voodoo3 3000 will also feature 16 MB of SDRAM.



\$689
DC3DF003

The 183MHz Voodoo3 3500 AGP board is expected to deliver up to 8 million triangles and 366 Megatexels per second at resolutions of up to 2,048 by 1,536 pixels. The Voodoo3 3500 will include 3Dfx's proprietary flat-panel support, LCDfx. Voodoo3 3500 features a 350MHz RAMDAC, TV/S-Video Out capabilities as well as a game bundle featuring best-selling titles. The Voodoo3 3500 will also feature 16 MB of SGRAM.

Specifically designed to suit Australian conditions the SwannSmart 56K line of modems bring a hassle free personal fax, data and voice telecommunication centre right to your fingertips!



SwannSmart 56K

The SwannSmart 56K modem brings full communication capabilities to your desktop today. Featuring a download speed of 56Kb/s and Group 3 faxing the SwannSmart 56K is available in both an external & internal version.



- ITU V.90 Standard
- Enhanced ADPCM CODEC for Voice
- Data Compression rates to 115,200bps
- Auto Dial & Answer
- Auto Power Management
- Answering Machine / Voice Mail
- 5 Year limited warranty



External
\$159
FMSWA000

Internal PCI
\$89
FMSWA001

SwannSmart 56K Global PC Card

Specifically designed to suit conditions almost anywhere in the world the SwannSmart 56K PC-Card brings a complete data communication centre to your laptop computer....anywhere!

- ITS V.90 & 56Kflex Standard
- Location selection utility automatically configures your modem settings relative to the country's standard
- Phone Cable Adaptor for various countries
- Countries supported include Australia, UK, USA, Taiwan, HK, Canada, Japan, Germany to name a few



Use in 27 Countries

\$185
FMSWA002

FREE WEBWORKS 99 INTERNET TOOLKIT

Modems & PC Cards

Robotics 56K VOICE MESSAGE MODEMS

Productive conference calls with the clarity and convenience of a top-quality full-duplex speakerphone - in the same device that brings the internet onto your desktop.

- ENHANCED FEATURES:**
- Full Duplex Speakerphone
 - Stores voice and fax messages even when your PC is switched off

STANDARD
\$265
FMROB011



PROFESSIONAL MODEM INCLUDES THE FOLLOWING EXTRA FEATURES:

- Caller ID
- One button access to voice mail
- Independent Fax Forwarding.

PROFESSIONAL
\$295
FMROB012



3COM MEGAHERTZ 56K GLOBAL FAX/MODEM

- Enjoy high-speed downloads up to 56 Kbps with the V.90 & x2 56K standard

- Intelligent Auto Installation

- Configure your modem for use worldwide



\$315 FMROB009

3COM MEGAHERTZ 10/100 LAN x 56K MODEM

- 10/100Mbps Ethernet & Fast Ethernet

- Enjoy high-speed downloads up to 56 Kbps with the V.90 & x2 56K standard

- Intelligent Auto Installation

- Configure your modem for use worldwide



\$425 FMROB013

NetComm CARDMODEM56



Netcomm CardModem56 The CardModem56 Combo is the ideal PCMCIA modem if you demand the ultimate in speed and portability

\$315 FMNET013

NetComm CARD MODEM 56K GLOBAL GSM

Gives the world traveller the freedom of data connection either through a land line or mobile phone (GSM), with data download speeds of up to a scorching 56,000bps.



WORD WIDE COMPATIBILITY

\$325 FMNET017

NetComm ROADSTAR II ULTRA 56K

The Roadstar II 56 Ultra SVD is a voice/data/fax modem which lets you transmit and receive faxes and data directly from your desktop. The USB version goes further eliminating the need for the a power supply.

HEADSET INCLUDED
FREE COPY OF SYMANTEC WINFAX V8.0



\$259 FMNET015

USB

SERIAL
\$259 FMNET012

Dynalink Modems / Multimedia

Dynalink Magic TVView

- TV tuner and video capture card - capture video and digital stills
- Supports Coax, composite, S-Video & Philips camera input
- Watch TV & rapid Teletext on your PC
- Full function remote control
- Optional FM radio tuner with auto-scan/memory
- Window or full screen


\$129

FMDYNxxx

(FM Tuner)

\$149

FMDYNxxx

Includes *ValuePack bonus software and 100 hours/30 days FREE TPG Internet access

Dynalink VoiceDesk56Pro & VoiceCard56Pro

- Dual-mode K56flex & V.90 auto switching
- Plug & Play
- FaxStream DUET & CallerID

**5 Year
Warranty**

VoiceDesk56 Pro External

\$169

FMDYN001



- Fax machine & Telephone Answer Machine (TAM)
- Hands-free Speakerphone (requires optional MK30 Headset)

VoiceCard56 Pro
Internal ISA
\$139

FMDYN000



Includes *ValuePack bonus software and 100 hours/30 days FREE TPG Internet access

Dynalink MacModem56Pro

- Mac Compatible
- Dual-mode K56flex & V.90 auto switching
- Plug & Play
- FaxStream DUET & CallerID
- Fax machine & Telephone Answer Machine FAXstf software


\$199

FMDYNxxx

Dynalink PCI 56k Internal Modem

- Dual-mode K56flex & V.90 auto switching
- Plug & Play
- Send and receive Faxes



PCI 56k Modem

\$79

FMDYN002

Includes *ValuePack bonus software and 100 hours/30 days FREE TPG Internet access

Dynalink PCMCIA (PC Card) Modem

- Dual-mode K56flex & V.90 auto switching
- Plug & Play
- Send and receive faxes
- Cellular ready, connects to analogue mobile phone (require additional hardware from telephone vendor)


**5 Year
Warranty**

CreditCard56 PCMCIA

\$179

FMDYN003

Includes *ValuePack bonus software and 100 hours/30 days FREE TPG Internet access

Dynalink USB Solutions

PCI to USB Card

Don't have USB ports, don't worry. Simply Plug in this PCI card and all USB devices will be at your disposal

\$55

CCDYN000

USB Mouse

USB mouse from Dynalink will free up your serial and PS/2 ports for other devices.

\$29

IODYN000



For more information on our products, please visit:

www.dynalink.com.au
***Value
Pack**
**• iPhone 5
included
FREE**
**• Norton
Utilities 3.0
for \$20**
**• Compton's
Infopedia
for \$15**
**• Quake 2 for
\$10**
**• Or the lot
for just \$40!**

retail pack only

*Redeem coupon with
manufacture

CDR/Digital Camers



Adelong Computers

Kodak, the world's largest manufacturer of CD-R media, has announced an all-new Windows 95/98/NT CD-R/RW drive. The Kodak 4802 internal ATAPI drive supports 8x read, 4x write and 2x rewrite. The new drive combines new Disc-at-once technology along with the capability to write data, audio, video CD and hybrid formats. The kit includes cables and integrated software and media.

\$499

MMKOD002



Playback Speed
Recording Speed
Buffer
Interface
Compatibility

Note:

1200KB/s (8x Speed)
600KB/s (4x Speed) CD-R, 2x Speed CD-RW
2 MB
ATAPI Enhanced IDE
Windows 95/98/NT Compatible
Packet CD software Windows 95/98 compatible only
- a patch will be available for NT soon

Form Factor

5 1/4", Half Height

Mitsumi Software

CD contains WinOnCD, Packet CD and Gazo Personal Image Warehouse software

Package contents

Kodak 4802IDE CD-R/RW Writer
CD-R Disc
CD-RW Disc
IDE Cable
HiFi Cable
Mounting Screws
Mitsumi Software CD and diskette



Kodak's new digital cameras boast high resolution and great features.

Kodak DC200plus



\$749

10KOD000

DC200/210plus Front

The KODAK DC210plus Digital Camera gives you the power to capture amazing, high quality images (1152 x 864) with vivid colour and enough dazzling detail for photo-realistic 5" x 7" prints. With a focus-free lens, auto-exposure and white balance, easy-to-use graphic interface and mode dial, built-in flash with red eye reduction, self-timer and all the ease of a pocket-sized, point-and-shoot camera. The DC200plus camera also comes with a 8Mb picture card for removable storage of up to 120 pictures.

Kodak DC210plus



\$999

10KOD001

DC200/210plus Back

The DC210 plus delivers spectacular detail, colour, and sharpness thanks to megapixel technology (1152 x 864) and a 2X wide-angle zoom lens, equivalent to 29-58 mm on a 35 mm camera. The DC210 Plus also has the user-friendly features, greater storage capacity with an 8 MB Picture Card, and an AC adapter right in the box. The colour LCD allows you to review/preview pictures instantly so you know you've got the shot you wanted.

Kodak DC240



\$1199

10KOD002

DC240 Front

The latest from the Kodak range, supports serial and USB transfer. Featuring 1.3 million pixels (1280x960), this is the highest resolution camera from Kodak. Features an auto focus 3x zoom lens and 1.8" TFT screen. Everything you need is included in the kit, 4x AA Nimh batteries and charger, 8Mb Compact Flash card and all the software needed. All serial and USB cables are included, even a TV output cable is included.

Sales staff are available (est) 9am-6pm Monday to Friday, 10am-4pm Saturday
Technical Support (5 Days a week 9am-6pm) Phone (02) 8344 3160



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Sales Hotline 02 8344 3190

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Zip 250



SuperFloppy Preferred By Millions
The new drive comes in two flavors: parallel port (for PC's) and SCSI (for Mac's or PC's with a SCSI connection). Zip 250 SCSI drive users will benefit from a performance boost, up to 56 times faster than standard floppy drives and 1.4 times faster than external CD-ROM drives. Best of all, current Zip 100 drive users need not worry about their investment in 100MB Zip using 250MB media).

- 50% faster than the original Zip 100 drive.
- Large 250Mb Capacity
- Compatible with 100Mb Zip Disk
- Proven Reliability



250Mb Zip
\$35
BUIOM034

SCSI
\$369
BUIOM032

Parallel
\$369
BUIOM033

Jaz 2GB Drive



The new Jaz Drives hold a whopping 2GB of data per disk. Best of all these drives are fast and backwards compatible with the industry standard 1GB disk. Stream & capture video, backup data and store images are just some of the applications that the Jaz Drive can be used for. SCSI Card needed.

INTERNAL
\$689
BUIOM017

EXTERNAL
\$689
BUIOM018



Free Traveller with the External Jazz 2

Click!



Click!™ drive can store 40Mb of data on a Click! Disk. The Click Drive not only reads your Click! Disk but also your Compact Flash and Smartmedia cards. The Mobile Click! Drive connects to your printer port using a pass through technology and can run on rechargeable batteries for mobile applications. There is even a Type II PC Card that will connect your Click! Drive up to your notebook. (Mobile bundle only)



\$20
BUIOM037

BUIOM035
BUIOM036

Click Camera Bundle
Click Camera+Mobile Bundle

\$495
\$575

Zip Drives



Increase your storage quickly, easily and economically - as you need it. With a 100MB Zip Drive you can take your data anywhere at anytime. Each disk stores 100MB of data and you can add them, as your needs grow. Available in Parallel, SCSI, Internal IDE and the new USB interface. You also get Zip tools on CD.

Drives

IDE SCSI
\$145



\$199

| | | |
|----------|------------------------------|--------------|
| BUIOM007 | 100MB INT IDE ZIP Drive | \$145 |
| BUIOM038 | 100MB EXT PARALLEL ZIP Drive | \$199 |
| BUIOM002 | 100MB INT SCSI ZIP Drive | \$239 |
| BUIOM039 | 100MB EXT SCSI ZIP Drive | \$199 |
| BUIOM026 | 100MB USB ZIP Drive | \$255 |

Accessories for Zip

| | | |
|----------|-----------------------------|--------------|
| BUIOM012 | 100MB PC ZIP Disk | \$24 |
| BUIOM005 | 100MB PC ZIP Disk (3 Pack) | \$63 |
| BUIOM006 | 100MB PC ZIP Disk (10 Pack) | \$190 |
| BUIOM015 | ZIP ZOOM SCSI Card | \$55 |
| BUIOM022 | ZIP Card, PCMCIA to SCSI | \$185 |



\$24
BUIOM012

Accessories for Jaz

| | | |
|----------|---------------------------------|--------------|
| BUIOM024 | JAZ 2GB Disk | \$195 |
| BUIOM025 | JAZ 2GB Disk (3 Pack) | \$559 |
| BUIOM031 | JAZ PCMCIA to SCSI Converter | \$215 |
| BUIOM013 | JAZ Traveller, SCSI to Parallel | \$85 |



\$179
BUIOM020

\$85
BUIOM013

Iomega Buz



All the hardware and software you need to be a video genius Introducing the Iomega Buz-the easiest way to get multimedia from camcorders, DVD, CD-Roms, VCRs and laserdiscs into your PC! It's a video capture and editing board combined with an Ultra SCSI controller that lets you capture Multimedia (fullmotion) video, sounds, digital pictures, music) into a PC

\$359
BUIOM023

APPLE MAC
\$525
BUIOM027



Available in Mac format

RICOH

CD RW Drives

**Adelong Computers**

A single drive that does it all. Reads, writes, Rewrites CD data.

Ricoh's MP7040 drive handles both CD-R and CD-RW discs. Providing an access speed of under 120msec, the MP7040A offers 20x reading of CD-R discs, 8x reading of CD-RW disks, and MultiSpeed 1x, 2x and 4x writing of both disks to meet every need. You can also depend on reliable writing with fewer interruptions thanks to Running OPC (Optimum Power Control) and a built-in 2MB buffer memory that helps eliminate buffer under-run a cause of writing errors.

Easy and simple just like a floppy

- 4x Recording 4x Rewriting & 20x Reading
- Drag & Drop operation just like a floppy disk
- For data distribution, back up and creating original CDs



Horizontal
& Vertical
installation
possible.



Fastest
CDRW Drive
Around

**4x ReWrite
Record
20x Read
MAX**



Ricoh
(1x4x)
CD-RW Disc 74
Mins 650Mb
\$29
MMRIC003



Ricoh
CD-R Disc 74
Mins 650Mb
\$3
MMRIC004

- Complete package including everything to start writing CD-R/RW
- Adaptec Direct 2.5, Easy CD Creator software
- 2MB data buffer memory • 120ms access time

EIDE

\$635

MMRIC005

Internal SCSI
\$745
MMRIC006

Storage Devices

ORB™

2.2GB
INTERNAL AND EXTERNAL

**Size. Speed.
For everyone.**

Easy to install Unlimited Capacity
Infinitely Rewritable

**Look at the power
ORB delivers!**

- 3.5 hours of audio
- 2+ hours of video
- 2,000+ colour photographs
- 22 100MB floppy disks
- SCSI, EIDE or Parallel Port versions
- 1500+ 1.44MB floppy disks
- 3+ CD ROM games



EIDE Drive

\$399

BU-ORB000



2.2 GB Disk

\$79

BU-ORB005

- | | | |
|----------|-------------------------------|--------------|
| BUORB000 | 2.2Gb Internal EIDE ORB Drive | \$399 |
| BUORB002 | 2.2Gb Internal SCSI ORB Drive | \$399 |
| BUORB005 | 2.2Gb ORB Disk | \$79 |

- | | | |
|----------|-----------------------------------|--------------|
| BUORB001 | 2.2Gb External Parallel ORB Drive | \$449 |
| BUORB003 | 2.2Gb External SCSI ORB Drive | \$449 |
| BUORB004 | 2.2Gb External USB ORB Drive | \$599 |

CASTLEWOOD

Sales staff are available (est) 9am-6pm Monday to Friday, 10am-4pm Saturday
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Sales Hotline 02 8344 3190**21**

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olympic
TECHNOLOGY

CDR / CD RW & DVD

Try the new Olympic range of disc storage products.



CD Writers With these Olympic CD Writer kits, all you have to do is plug in the drives, install the software and burn away. Whether you are a musician mastering your own CD or using CD's to backup your data, these kits are the most economical way to go.

Olympic 4x24 SCSI CD Writer Kit

- Internal Teac 4x record and 24x read Drive
- PCI SCSI Controller
- "Win On CD to go" version 4.5 recording software
- Cables Drivers and Manuals

\$545 MMOLY000

Olympic 6x24 SCSI CD Writer Kit

- Internal Teac 6x record and 24x read Drive
- PCI SCSI Controller
- "Win On CD to go" version 4.5 recording software
- Cables Drivers and Manuals

\$845 MMOLY001

CD ReWriters Want to use CD media but need to record over and over your data. Using one of the fastest ReWriters in the business, this kit is ideal for the power user.

Olympic 4x4x20x SCSI CDR Writer Kit

- Internal Ricoh 4x Rewrite, 4x Write and 20x Reading Drive
- PCI SCSI Controller
- "Win On CD to go" version 4.5 recording software
- Cables Drivers and Manuals



\$745 MMOLY003



\$395 MMOLY003

DVD This kit will allow you to watch and play DVD titles on your computer. Simply install this kit and it's bundled software and turn your PC into a full home theatre system.

Olympic 6xDVD IDE Kit

- Internal 6x DVD-ROM, 32x CD-ROM Drive
- Toshiba Mpack2 8Mb AGP, 2D + 3D VGA/ Hardware Mpeg 2 Decoder/AC-3 Digital Audio Card
- Cables Drivers and Manuals

Monitors

LITEON

Excellent value in a good quality monitor. These monitors are backed with a 3 year warranty.



LiteOn A1554 15"

13.8" True Viewable
0.28 Dot pitch
Max Resolution
1024x768
OSD

\$285 MOLIT000



LiteOn A1770 17"

16" True Viewable
0.27 Dot pitch
Max Resolution
1280x1024
OSD

\$475 MOLIT001



LiteOn A1996 19"

18" True Viewable
0.26 Dot pitch
Max Resolution
1600x1200
OSD

\$899 MOLIT002



Monitors

3 YEAR ON SITE WARRANTY*

MITSUBISHI ELECTRIC
EXCELLENCE THROUGH INNOVATION



Adelong Computers

TFT Make the switch to TFT technology. These Thin Film Transistor screens have unparalleled picture quality, consume less power and produces less heat. The image is flicker free hence reducing eye strain and headache.

Mitsubishi RDT150S 15.1" TFT-LCD

- 15.1" true viewable display
- Flicker free 1024 x 768
- Full Colour Display
- Automatic image adjustment
- On Screen Display image adjustment
- Plug and lay compatible
- Include Macintosh adapter



\$2150 MCOMIT004

Mitsubishi RDT180S 18.1" TFT-LCD

- 18.1" true viewable display
- Flicker free 1280 x 1024
- Frame Rate Control delivers a full colour display
- Automatic image adjustment
- On Screen Display image adjustment
- Plug and lay compatible
- Include Macintosh adapter



\$6095 MCOMIT008

CRT The value and quality of these CRT monitors are hard to go by. Mitsubishi's famous DiamondTron picture tube is recognised for it's excellent value and performance.

Mitsubishi Diamond View 1772E 17"

- Advanced PnP compatibility
- 15.9" True Viewable
- 0.27Dot Pitch
- Maximum Resolution: 1280x1024 up to 60Hz



\$595 MCOMIT002

Mitsubishi Diamond View 1995 19"

- High contrast 19" picture tube with 18" viewable.
- Maximum Resolution 1600 x 1200 pixels at 75 Hz
- 'the only 19" to equal & better Sony in our tests'



APC MAGAZINE APRIL 1999

\$1215 MCOMIT005

Mitsubishi Diamond View 1554 15"

- Advanced Plug & Play
- Superior image fidelity 0.28 Dot Pitch
- 13.6" True viewable
- Maximum Resolution 1024x768 up to 65Hz



\$315 MCOMIT003

Mitsubishi Diamond View 2107 21"

- 0.26mm Dot Pitch
- 20" Viewable
- Max Resolution 1600 x 1200 at 80Hz
- 15 pin & BNC output

VALUE

'Compared to the Sony Trinitron, the Diamond View scored equal to, or better than in every regard, apart from brightness'



\$2030 MCOMIT006



APC MAGAZINE APRIL 1999

DRIVES

Reliability and economy is the attraction of these drives. Whether you need a floppy drive or a CD-Rom drive, Mitsubishi will cater to your needs.

Mitsubishi CD-ROMS



| Code | Model | Price |
|----------|------------------------------------|-------|
| MMMIT003 | Mitsubishi Diamond Data 36X CD-ROM | \$85 |
| MMMIT001 | Mitsubishi Diamond Data 40X CD-ROM | \$95 |

Mitsubishi LS-120



| Code | Model | Price |
|----------|---|-------|
| BUMIT000 | Mitsubishi LS - 120 - 120MB Capacity. | \$169 |
| BUMIT001 | 120MB capacity diskettes to suit LS - 120 Drive | \$25 |

Mitsubishi Floppy Disk Drive



| Code | Model | Price |
|----------|---|-------|
| FDMIT000 | Mitsubishi Diamond Data 1.44MB Floppy disk drive. | \$55 |

Sales staff are available (est) 9am-6pm Monday to Friday, 10am-4pm Saturday
Technical Support (5 Days a week 9am-6pm) Phone (02) 8344 3160



RESELLER ENQUIRIES WELCOME

*Please read our Terms and Conditions

Sales Hotline 02 8344 3190

Videocom

Monitors

| Model | 15"DD-556BA | 17"DC-770BA | 17"DC-770LAT | 19" DA-995 |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| Screen Size | 13.8" Viewable | 16" Viewable | 16" Viewable | 18"Viewable |
| Dot Pitch | 0.28mm | 0.27mm | 0.25mm | 0.25mm |
| Max Resolution | 1024x768 N/I | 1280 x 1024 N/I | 1280 x 1024 N/I | 1600 x 1200 N/I |
| User Control | OSD | OSD | OSD | OSD |
| Price | \$290 MOVID003 | \$495 MOVID000 | \$555 MOVID002 | \$949 MOVID001 |
| 3 YEAR ON SITE WARRANTY* <small>*QUEENSLAND, NSW, VICTORIA ONLY</small> | | | | |
| | | | | |
| 15"DD-556BA \$290 MOVID003 17"DC-770 BA \$495 MOVID000 19" DA-995 \$949 MOVID001 | | | | |

HOT SPECIAL

Networking

NETGEAR

Analogue Router + 56K Modem

COMPLETE SOLUTION FOR SOHO INTERNET ACCESS

Share Internet access with your small office/home users with the RM356 Analogue Router. Using a single ISP account and phone line users can now check email, browse the Internet & download information simultaneously. Connect up to 4 computers to the RM356 or connect the RM356 to your hub for unlimited connections.

- Built in 56K V.90 modem and integrated 4 port hub
- Supports Dynamic IP, DHCP, NAT, PPP

\$599

NWNGR017



RT 328 ISDN Router

The NETGEAR RT328 ISDN Router provides Internet access, LAN-to-LAN Intranet connection, and remote access for a single user, a small business, or a branch office over ISDN. The RT328 combines the latest in networking technology, found only in high-priced business models, with ease-of-use designs and a price affordable office.

- Dynamic NAT enables entire workgroup to share an Internet Connection
- Supports PPP& 128Kb MultiLink PPP, TCP/IP, RIP, CHAP
- Firewall Security & Control, Callback
- Simple configuration with Windows GUI or Telnet
- Use DHCP to assign addresses for IP Gateway, DNS for LAN
- 2 Analogue POTS, 1 10BaseT Connection

\$715

NWNGR018



NETGEAR Print Servers

NETGEAR print servers enable you to connect printers to the network for sharing among multiple PCs. Compared to attaching a printer to your PC, the print server gives more cost effectiveness, better performance, and simultaneous support for Windows, Netware, and UNIX printing.

- PS104AU NWNGR000 **\$315**

Perfect for the SOHO user the PS104 supports 1 Parallel printer and up to 4 PCs via its built in 4-port 10Mbps Ethernet hub. Connect the PS104AU to a hub for unlimited connections.

- PS110AU NWNGR001 **\$395**

Connect up to 2 Parallel printers to the PS110AU. Attach the PS110AU to any 10/100Mbps network.



Ethernet Hubs

Choose from a range of 10Mbps and 100Mbps Ethernet Hubs



| Code | Description | 10Mbps | 100Mbps | Rackmount | Price |
|----------|--------------------------------|--------|---------|-----------|---------------|
| NWNGR007 | EN116AU 16 Port Hub with BNC | ✓ | | | \$215 |
| NWNGR012 | ED516AU 16 Port Hub with BNC | ✓ | | ✓ | \$295 |
| NWNGR013 | EN524AU 24 Port Hub with BNC | ✓ | | ✓ | \$415 |
| NWNGR014 | DS108AU 8 Port Dual Speed Hub | ✓ | ✓ | | \$435 |
| NWNGR019 | DS516AU 16 Port Dual Speed Hub | ✓ | ✓ | | \$1175 |
| NWNGR020 | DS524AU 24 Port Dual Speed Hub | ✓ | ✓ | | \$1615 |

D-Link Ethernet NICs



\$60 NWDLI002

Ensure your future network upgrades are catered for with this 10/100 auto-negotiating network adapter. Plug & Play support for trouble free installation.



\$199 NWDLI006

The ideal kit for beginners or enthusiast looking to set up a network. Includes 2 x 10Mbps Network cards, 2 x 7m CAT 5 cable & a 5 Port hub for future expansion.

| Item Code | Model | Bus | Speed | Price |
|-----------|-----------|-----|------------|-------------|
| NWDLI000 | DE-220PCT | ISA | 10Mbps | \$35 |
| NWDLI001 | DE-528CT | PCI | 10Mbps | \$40 |
| NWDLI026 | DE-500TX | PCI | 10/100Mbps | \$85 |

Ethernet & Modem PC-Cards



PCMCIA 10/100Mbps LAN & 56K Modem PC Card.

- V.90 Fax/Data Modem.
- Compatible with 10 & 100Mbps Networks

\$425 NWDLI025

| Item Code | Model | Description | Price |
|-----------|-----------|-----------------------------|--------------|
| NWDLI003 | DE-660CT | 10Mbps PCMCIA Ethernet Card | \$110 |
| NWDLI013 | DFE-650TX | 10/100Mbps PCMCIA card | \$225 |

Print Servers



Turn any printer into a network printer through D-Link's range of print servers. Just plug in your printer and connect the print server to your Network hub via Ethernet. Compatible with Win NT/ 95/ 98, UNIX, TCP/IP, NetBEUI, IPX & AppleTalk Protocols. 10/100Mbps Enabled

\$429 NWDLI015

| Item Code | Model | Printers Supported | Price |
|-----------|--------|--------------------------------------|--------------|
| NWDLI015 | DP-300 | 2 x Parallel, 1 x serial, 10/100Mbps | \$429 |
| NWDLI023 | DP-101 | 1 x Parallel, 10Mbps | \$275 |

Fax/Modems



D-Link's range of Fax/Modems are V.90 & K56 Flex compatible utilising the high performance Rockwell chipset.

\$165 EXTERNAL FMDLI001

| Item Code | Model | Description | Price |
|-----------|----------|---|--------------|
| FMDLI000 | DFM-560I | 56K Internal Modem | \$135 |
| FMDLI001 | DFM-560E | 56K External Modem | \$165 |
| FMDLI002 | DFM-MAC | MAC connectivity kit with software, cables for 560E | \$49 |

Internet Servers



\$529 NWDLI024

The DP-602 makes connecting your LAN to the Internet easier than ever by sharing one ISP Account with all users. Features include NAT, Dial-on-demand, DHCP and PPP. With support for both analogue modems and BRI ISDN T/A the DP-602 also allows the use of both COM ports for double bandwidth.

Ethernet & Fast Ethernet Hubs

D-Link's range of hubs provide easy connectivity options for Ethernet users as well as a cost effective way to upgrade to Fast Ethernet networks.

10Mbps Ethernet Hubs

| Item Code | Model | Ports | BNC / AUI | Price |
|-----------|-----------|--------|-----------|--------------|
| NWDLI017 | DE-805TP | 5 UTP | | \$99 |
| NWDLI004 | DE-809TC | 8 UTP | BNC | \$149 |
| NWDLI028 | DE-809TP | 9 UTP | | \$149 |
| NWDLI029 | DE-810TAC | 8 UTP | ✓ | \$269 |
| NWDLI005 | DE-816TP* | 16 UTP | ✓ | \$325 |
| NWDLI030 | DE-824TP* | 24 UTP | ✓ | \$485 |

100Mbps Ethernet Hubs

| Item Code | Model | Ports | Price |
|-----------|------------|-------|--------------|
| NWDLI031 | DFE-816STX | 16 | \$974 |

10/100Mbps Nway Dual Speed Hubs

These Dual Speed Hubs provide a network that is compatible with a mixture of 10Mbps & 100Mbps users.

| Item Code | Model | Ports | Stackable | Price |
|-----------|------------|-------|-----------|---------------|
| NWDLI027 | DFE-904 | 4 | | \$226 |
| NWDLI012 | DFE-908X | 8 | ✓ | \$735 |
| NWDLI014 | DFE-916DX | 16 | ✓ | \$1195 |
| NWDLI020 | DFE-2624X* | 24 | ✓ | \$2025 |

*Rackmount 19"

Ethernet & Fast Ethernet Switches



For a cost effective solution aimed at reducing network congestion look to D-Link's range of switches for improving network performance.

DES-1008 8x10/100NWAY

\$1,645 NWDLI022

| Item Code | Model | Ports | 10Mbps | 100Mbps | Price |
|-----------|----------|-------|--------|---------|---------------|
| NWDLI011 | DES-810 | 10 | 8 | 2 | \$859 |
| NWDLI021 | DES-815 | 15 | 12 | 3 | \$1195 |
| NWDLI032 | DES-1016 | 16 | ✓ | ✓ | \$2121 |
| NWDLI022 | DES-1008 | 8 | ✓ | ✓ | \$1645 |

Sales staff are available (est) 9am-6pm Monday to Friday, 10am-4pm Saturday
Technical Support (5 Days a week 9am-6pm) Phone (02) 8344 3160



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Sales Hotline 02 8344 3190

Software

Microsoft Office 2000

Office 2000 is finally here!

With six complete Office 2000 applications you will find office tasks easier. Microsoft offers you four unique packages to choose from: Microsoft office 2000 Standard, Microsoft office 2000 Premium, Microsoft office 2000 Developer and Microsoft office 2000 Small Business.



Microsoft Office 2000

SWMST078 **\$915**

Microsoft Office 2000 Professional includes:
Microsoft Word,
Microsoft Excel,
Microsoft Outlook,
Microsoft PowerPoint,
Microsoft Access,
Microsoft Publisher.

PLUS
Microsoft Small Business Tools.

If you have any questions, simply call our friendly sales team on 02 8344 3190.

Microsoft



Microsoft

| Item Code | Description | Price |
|-----------|---------------------|--------------|
| SWMST020 | MS FrontPage 98 | \$175 |
| SWMST021 | MS FrontPage 98 UPG | \$85 |
| SWMST069 | MS Windows 98 UPG | \$139 |
| SWMST070 | MS Windows 98 NEW | \$275 |

| Item Code | Description | Price |
|-----------|----------------------------|---------------|
| SWMST076 | MS Office 2000 STD | \$759 |
| SWMST077 | MS Office 2000 STD UPG | \$415 |
| SWMST078 | MS Office 2000 PRO | \$915 |
| SWMST079 | MS Office 2000 PRO UPG | \$535 |
| SWMST080 | MS Office 2000 SBE | \$759 |
| SWMST081 | MS Office 2000 Premium | \$1245 |
| SWMST082 | MS Office 2000 Premium UPG | \$635 |

Software

SYMANTEC

Check you y2K compliance with Norton 2000, and protect you computer system and data from viruses with the famous Norton Antivirus.

| Item Code | Description | Price |
|-----------|---------------------------|--------------|
| SWSYM017 | Norton 2000 | \$65 |
| SWSYM000 | Norton AntiVirus 5.0 Gold | \$85 |
| SWSYM003 | WinFax Pro 9.0 | \$139 |
| SWSYM004 | Pc AnyWhere 8.0 | \$215 |



PowerQuest

If Hard Disk Utilities are your needs then Powerquest's range of innovative drive mirroring and partitioning software is the ticket for you.

| Item Code | Description | Price |
|-----------|----------------------------|--------------|
| SWPOW001 | PowerQuest Partition Magic | \$125 |
| SWPOW002 | PowerQuest Drive Image | \$125 |
| SWPOW003 | PowerQuest Drive Copy | \$49 |



M.Y.O.B.

Known to be one of the easiest to use accounting packages, MYOB caters for most small to medium sized businesses.

| Item Code | Description | Price |
|-----------|-----------------|--------------|
| SWMY0000 | First Account | \$175 |
| SWMY0001 | M.Y.O.B | \$335 |
| SWMY0002 | M.Y.O.B Payroll | \$485 |



Check2000

One of the most thorough ways to check your computing system for Y2K compliance. With Check 2000, you can join Adelong and sail smoothly past the new millenium.

| Item Code | Description | Price |
|-----------|------------------|-------------|
| SWGREG001 | Check2000 deluxe | \$85 |
| SWGREG000 | Check2000 | \$69 |



Scanners



Adelong Computers

These scanners represent the best value for money. Comes complete with every thing you need including easy to use software.



OTC-600 EP

30bit Colour Depth
Optical Resolution 300x600 dpi
Max. Resolution 4800x4800 dpi
Scan Area 8.5"x11.6" (A4)
Parallel Connection

\$119 IOOLY000

OTC-1200 EP

30bit Colour Depth
Optical Resolution 600x1200 dpi
Max. Resolution 9600x9600 dpi
Scan Area 8.5"x11.6" (A4)
Parallel Connection

\$155 IOOLY001

OTC-1200 SP

30bit Colour Depth
Optical Resolution 600x1200 dpi
Max. Resolution 9600x9600 dpi
Scan Area 8.5"x11.6" (A4)
SCSI 2 PC & Mac

\$255 IOOLY002

Scanners

UMAX

UMAX 610

The new UMAX 610 colour scanner is most affordable scanner. It features high optical resolution of 600 dots per inch and simple Parallel Port connection means no hassles installation and setup.

Specifications:

- Connectivity: Parallel Port Pass through/SCSI
- Colour: Colour & Monochrome
- Resolution: 600 dots per inch, 4800 dots per inch enhanced
- Colour: 30-bit
- VistaScan



610P **\$145** IOUMA002 610S **\$279** IOUMA003

UMAX 1220

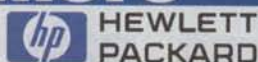
The Astra 1220 series was designed specifically for corporate or small office users who want something more from their scanner. Built with a 36 bit colour CCD, the Astra 1220 captures an amazing 68.7 billion colours to bring all your images to life.

Specifications:

- Connectivity: USB Parallel Port SCSI
- Colour: Colour & Monochrome
- Resolution: 1200x600 dots per inch Hardware Super Sampling, 9600 dots per inch enhanced
- Colour: 36-bit
- VistaScan



1220S **\$495** IOUMA005 1220U **\$345** IOUMA006 1220P **\$279** IOUMA00



HP ScanJet 4200C

The new HP ScanJet 4200C colour scanner is designed to simplify colour scanning. With push-button scanning and push-button colour copying, anyone can get great results with the HP ScanJet 4200C. The Universal Serial Bus (USB) means effortless, trouble-free installation and use. All at a truly affordable price.

Specifications:

- Connectivity: Conflict-Free USB
- Colour: Colour & Monochrome
- Resolution: 600 dots per inch Hardware Super Sampling, 9600 dots per inch enhanced
- Colour: 36-bit
- HP's PrecisionScan LT



IOAHD021 **\$385**

HP ScanJet 6200C

Productivity means completing your task quickly -with the quality you need. With the HP ScanJet 6200C Professional Series colour scanner, you can be up to 4 times more productive than with comparable scanners.

Specifications:

- Connectivity: USB and SCSI (SCSI card and Cable not supplied)
- Colour: Colour & Monochrome
- Resolution: 1200 dots per inch Hardware Super Sampling, unlimited enhanced resolution
- Colour: 36-bit
- HP's PrecisionScan Pro



IOAHD014 **\$765**

Sales staff are available (est) 9am-6pm Monday to Friday, 10am-4pm Saturday
Technical Support (5 Days a week 9am-6pm) Phone (02) 8344 3160



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Sales Hotline 02 8344 3190

BUBBLEJET PRINTERS

VALUE

BJC-265

- Black 3.4ppm, Colour 0.5ppm
- A4 720 x 360 DPI
- Super Economy mode for B&W and Colour. Up to 5 times the output of competitors



PRCAN026

SOHO

BJC-4310

- Black 4.5ppm, Colour 2ppm
- A4 720 x 360 DPI
- Optional Photorealism ink for photo printing. Get instant scan capabilities with optional scan head



PRCAN021

PROFESSIONAL

BJC-7100

- Black 8ppm, Colour 5ppm
- A4 1200 x 600 DPI
- 7 Colour Photo ink for rich photographic half tones. Plain Paper optimized printing
- 130 page sheet feeder



PRCAN025

A3 GRAPHICS

BJC-5000

- Black 7.5ppm, Colour 2.85ppm
- A3 1440 x 720 DPI
- 7 Color Photo ink and A3 capable via manual feed.
- 130 page sheet feeder



PRCAN022

PORTABLE PRINTERS

COMPACT

BJC-80

- Black 4.5ppm, Colour 1ppm
- A4 720 x 360 DPI
- 30 Sheet Automatic feeder.
- Instant scan capabilities with optional



PRCAN000

ULTRA MOBILE

BJC-50

- Black 5.5ppm, Colour 2ppm
- A4 720 x 360 DPI
- Optional automatic sheet feeder
- Instant scan capabilities with optional scan head.



PRCAN020

LASER PRINTERS

SOHO

LBP-660

- Black 6ppm Window Printing System
- A4 600 & 300 DPI
- 100 Page Sheet Feeder. Emulation to
- 2400DPI Printing. Instant start-up with scan head.



PRCAN011

WORKGROUP

LBP-1760

- Black 16ppm, 4MB Memory (MAX 36Mb)
- A4 1200 & 600 DPI (opt PS)
- 500 Page Sheet Feeder. Emulation to
- 2400DPI Printing. Networkable option
- low energy consumption



PRCAN027

SCANNERS

VALUE

FB-320P

- Parallel
- Scanning at 300dpi
- B&W 20sec, Colour 60sec
- scan head.



INCAN002

SOHO

FB620P

- Parallel
- A4 Scanning 600DPI, Enhanced 2400DPI Resolution
- B&W 40sec, Colour 120sec



INCAN003

DIGITAL CAMERA

POWERSHOT A5 ZOOM

POWERSHOT A5 ZOOM

- 1024 x 768 pixel (XGA) resolution
- 810,000 pixel CCD sensor, 1/3 inch
- 2.5X Zoom Lens
- 8Mb Flash Card holds 125 Normal or 89 high-res images
- One of the smallest designs on the market



JOCAN006

Printers

EPSON



Adelong Computers

A4 Colour Inkjet

Value

Stylus Colour 440

- 4ppm Black/2.7ppm Colour
- 720dpi
- Perfect images and clear sharp text everytime thanks to the 720 dpi resolution. With QuickDry Inks your documents are dry to touch the moment they leave the printer!

\$245

PREPS019



Home User

Stylus Colour 640

- 5ppm Black/3.8ppm Colour
- 1440dpi
- Perfect Photo Quality printer for desktop publishing at home. It features true 1440 x 720 dpi resolution.

\$320

PREPS020



SOHO

Stylus Colour 740

- 6ppm Black/6ppm Colour
- 1440dpi
- Delivers a precisely controlled ink droplets - the result is greater detail and smoother halftones. It's PC and Mac compatible and offers USB connectivity.

\$485

PREPS021



Office Colour

Stylus Colour 900

- 12ppm Black/11.7ppm Colour
- 1440dpi
- It also offers flexible connectivity, Serial, USB, Parallel and optional ethernet. The combination of printing technologies ensure it is a high-speed, high-image quality printer.

\$790

PREPS024



Specialist Printers

Photo Colour

Stylus Photo 700

- A4, A5, Envelope, Index card, Photo paper
- 1440dpi
- Using a six-colour QuickDry ink system (CcMmYK), that delivers continuous tones, smooth gradations, sharp detail and more vibrant colours.

\$425

PREPS011



Oversize Photocolor

Stylus PhotoEX

- A3, A4, A5, Envelope, Index card, Photo paper
- 1440dpi
- Photo EX can handle a range of paper sizes from A6 to A3 and panoramic and, supports a variety of media from plain paper to Photo Quality Glossy Film

\$759

PREPS015



Graphic Reproductions

Stylus Photo1200

- A3+, A4, A5, Envelope, Index card, Photo paper
- 1440dpi
- The PHOTO 1200 delivers 1440dpi, full-bleed A3+ prints with ink droplets invisible to the naked eye.

\$960

PREPS025



Large Format

Stylus Colour 1520

- A2*, Super A3/B, US B, A4, letter, legal, B4, B5, envelope, continuous paper,
- 1440dpi
- Stylus COLOR 1520 provides the means of printing to A2 and SuperA3/B sized paper.

\$1095

PREPS010



Printers



HEWLETT
PACKARD

\$259

PRHPD039



HP Deskjet 695C

Featuring the latest in colour printing technology with Colour Smart II. Easy to use & install the Deskjet 695 will output .5ppm in black or 1.7ppm in colour at 600dpi.

\$325

PRHPD040



HP Deskjet 710C

Want photo quality printing that won't cost the earth. Then the HP 710C is your ideal partner. Print black at 6ppm and colour at a staggering 3ppm. This stylish yet practical printer will handle a variety of papers including envelopes & cards.

NEW

\$569

PRHPD051



HP Deskjet 880C

Super-fast printing and stunning results on plain paper is what to expect from the new HP 880C. Your black text will look more laser like while colour prints will bring life to your documents & images. Output is rated at 8ppm in black & 2ppm in colour. USB and Parallel interface.

NEW

\$1,385

PRHPD017



HP LaserJet 2100

Introducing the latest HP 2100 series of LaserJet printers. Great for workgroup computing the HP 2100 features a print resolution of 1200dpi, 10ppm output, 350-sheet feeder & a monthly print cycle of 15,000 pages.

| Item Code | Description | Price |
|-----------|---|--------|
| PRHPD048 | 2100M with 8MB RAM, Postscript | \$1595 |
| PRHPD049 | 2100TN with 8MB RAM, Network ready, Ps. | \$1895 |

\$789

PRHPD041



HP LaserJet 1100

Excellent for the home or small office, the HP 1100 produces stunning results whilst offering expandability and excellent value for money. JetPath technology allows you to upgrade the HP 1100 to include a scanner at any time.

\$785

PRHPD033



HP OfficeJet 635

The OfficeJet 635 is an integrated fax, Colour printer, colour copier & colour scanner - all in one.

Print: 600dpi at 5ppm in black & 2ppm in colour

Fax: Plain paper fax & 20 page document feeder

Scan: 1200dpi enhanced with OCR software

Copy: Resizable colour copying or B&W copies independent of the PC.

| Item Code | Description | Price |
|-----------|--------------|-------|
| PRHPD043 | Deskjet 895C | \$795 |
| PRHPD051 | Deskjet 880C | \$569 |

| Item Code | Description | Price |
|-----------|----------------|--------|
| PRHPD046 | LaserJet 1100A | \$925 |
| PRHPD034 | LaserJet 3100 | \$1345 |

| Item Code | Description | Price |
|-----------|-----------------|--------|
| PRHPD035 | OfficeJet 1170C | \$1369 |
| PRHPD037 | OfficeJet 1175C | \$1795 |

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Technical Support (5 Days a week 9am-6pm) Phone (02) 8344 3160



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Sales Hotline 02 8344 3190

Data Switches

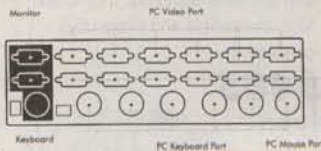
Never again will you need multiply monitors, keyboards and pointing devices with the range of CPU Switching devices. A single keyboard, mouse and monitor can control up to 8 computers simultaneously without any cable changes. These CPU Switches are digital and require only the push of a button. Excellent for network administrators or anyone who wishes to control 2 or more computers hassle free!

Features: • Supports Mouse/KB emulation for automatic bootup • Supports VGA, SVGA & Multisync monitors • LED's give current status • Easy to install & use

AT CPU Switches

for computers with serial mice & DIN Keyboard interface

- Supports Serial Mouse, 5DIN keyboard, standard 15PIN VGA connector
- Use hot keys (kb) or buttons to switch between computers
- VGA Bandwidth of 100Mhz
- Support up to 1024 x 768 Mhz @85Hz



- CS-102

Control up to 2 PCs with the CS-102.



DSADE030

\$245

- CS-106

Control up to 6 PCs with the CS-106

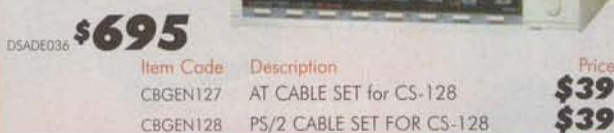


DSADE020

\$395

- CS-128

8 Port Switch Box



DSADE036

\$695

Item Code

Description

Price

CBGEN127

AT CABLE SET for CS-128

\$39

CBGEN128

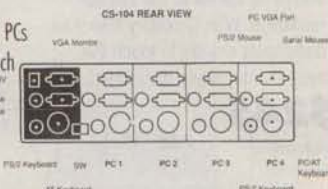
PS/2 CABLE SET FOR CS-128

\$39

AT and PS/2 CPU Switches

catering for all computers

- Use PS/2 or AT peripherals to control all PCs
- Supports Microsoft Intellimouse & Logitech Mouseman
- LED's give current mode status
- CS-122 requires the input device to be PS/2 else convertor required



- CS-122 Switch between 2 PCs. Features:

- VGA Bandwidth of 180Hz
- VGA resolution of 1600x1200 @60Hz



DSADE037

\$275

- CS-114 Control up to 4 PCs with the CS-114.

- VGA Bandwidth of 100Mhz
- VGA Resolution of 1024x768 @80Hz
- Support intellimouse wheel

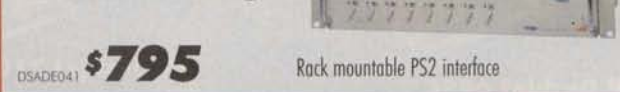


DSADE038

\$395

- CS-138 Control up to 8 PCs with the CS-138. Features:

- VGA Bandwidth of 180Mhz
- VGA Resolution of 1600x1200 @60Hz

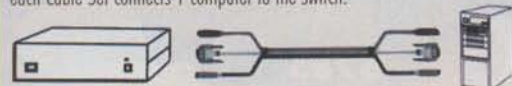


DSADE041

\$795

Rack mountable PS2 interface

CPU SWITCH CABLE SET For use with the CPU Switches, each Cable Set connects 1 computer to the switch.



AT CABLE SET 3M

\$35



Code

Model

Price

CBGEN099

PS/2 CABLE SET 3M

\$39

CBGEN163

1.8M AT CABLE SET

\$29

CBGEN164

1.8M PS2 CABLE SET

\$29

CBGEN166

10M PS2 CABLE SET

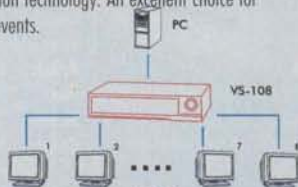
\$65

VIDEO SPITTERS

can duplicate PC video signals and amplify them for transmission to multiple monitors. These splitters are capable of supporting high band widths, which can easily accommodate the latest resolution technology. An excellent choice for presentations or broadcasting demos or special events.

Specifications:

- Max cable distance of 65 meters
- Supports VGA, SVGA & multisync monitors
- Slide switch for Video Signal Gain Control



VGA Bandwidth:

- VS-102 / VS-104 supports 200Mhz
- VS-108 supports 180Mhz

VGA Resolution (MAX)

- VS-102 / VS-104 supports 1600x1200 @70Hz
- VS-108 supports 1600x1200 @60Hz

VS-102

2 Port Splitter

DSADE000 **\$95**

VS-104

4 Port Video Splitter

DSADE001 **\$135**

VS-108

8 Port Video Splitter

DSADE002 **\$195**

1.8m Video Splitter to Monitor Cable **\$9**

CBGEN035

USB Devices



Adelong Computers

UNIVERSAL SERIAL BUS (USB) HUB

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D5ADE039

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- Windows FIFO UART

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USB A CABLE

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USB B CABLE

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CBGEN156

USB ETHERNET ADAPTER

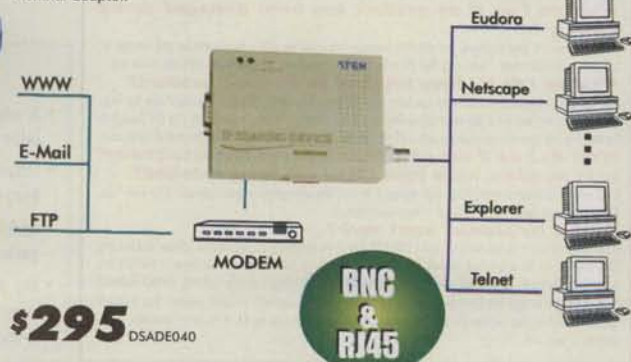
The USB Ethernet Adapter provides an easy way to connect a USB-enabled desktop or laptop PC to a 10BASE-T Ethernet LAN. It uses a USB type A receptacle for connection to the USB port and RJ-45 receptacle for connection to the network. No more internal PC cards to deal with. Just plug it in and your ready to go (PnP). Compatible with desktop and notebook computers. For use with IEEE802.3 10Base-T LANs.

\$95
D5ADE043



IP SHARING DEVICE

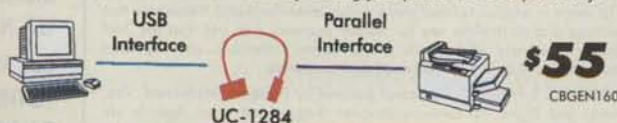
Wish everybody on your network had Internet Access but not the high costs and complexity associated with multiple accounts. If this is you, then the IS-100 IP Sharing Device is for you. By using a single Internet account with the IS-100, your whole network can have Internet Access simultaneously. The IS-100 can also act as a DHCP server and offer Firewall protection and connects to the Internet through either a 56K modem or ISDN terminal adaptor.



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D5ADE040

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USB to MODEM ADAPTER

With the UC-232, ATEN's new USB to Modem Adapter, installing an external modem is a snap. Free up your serial ports for other devices while IRQ conflicts will be a thing of the past. With our UC-232, installing a modem has never been easier. Just connect one end of the adapter to your modem and the other to your computer's USB port.

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H: 410mm

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* Styles may vary

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| Code | Model | Price |
|----------|----------------------|-------------|
| PSGEN000 | 200W AT POWER SUPPLY | \$35 |

| Code | Model | Price |
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Page 9

SYMANTEC

Great bundles that
save you \$\$\$ Page 43

XIRCOM

RealPort GSM
Connection kits Page 19

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Scanners & Digital
Cameras Page 38

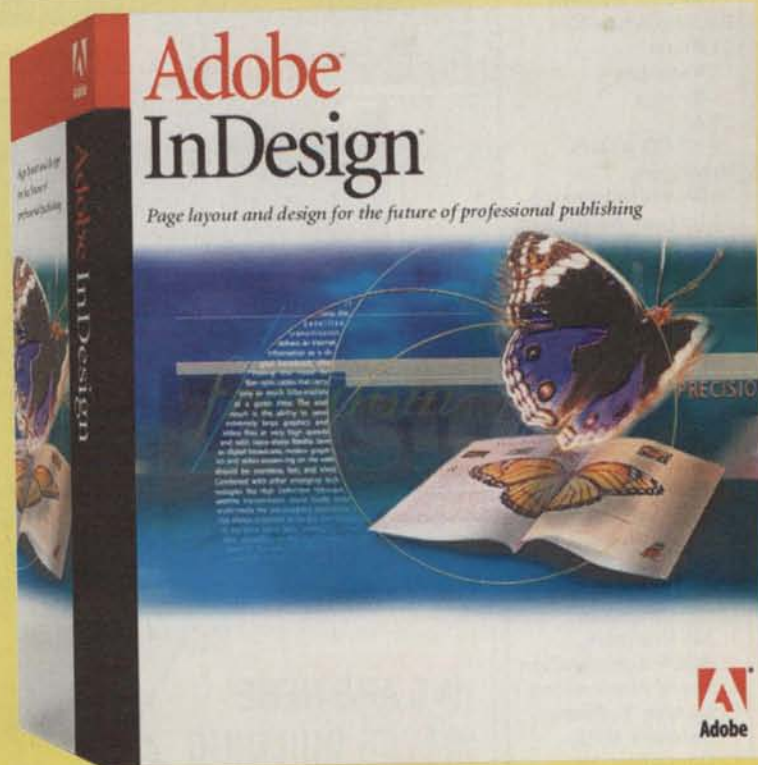


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INDEX

85 Staff - 76 phone lines

PCs/Notebooks/Server

- 3 3Com Palm
- 4/5 Toshiba Notebooks
- 6/7 Toshiba Notebooks
- 8/9 HP Notebooks, Desktops
- 10 IBM Notebooks
- 11 IBM Desktops
- 12 SGI Desktops
- 13 SGI Desktops
- 14 Compaq
- 15 Compaq
- 16 Compucon
- 17 Casio
- 39 Rolodex Rex Modems
- 17 Swann Modems
- 18 TDK Modems
- 19 Xircom Modems
- Back-up & CD-ROM
- 22 Ricoh
- 23 Verbatim
- 24 Iomega
- 25 APC
- 56 HP CD Writers
- Networking
- 20 D-Link Networking
- 21 Netgear Networking
- Monitors, Cameras
- 26 Sony Monitors
- 27 Philips Monitors
- 28 Vision Beyond 2020
- 29 Kodak Cameras
- 49 Logitech Cameras/Mice/Keyboards
- Printers, All-in-one, Scanners
- 30 Lexmark Printer
- 31 Canon Printer
- 32 Tektronix Printer
- 33 Epson Printer
- 34 HP Laser Printers
- 35 HP DeskJets
- 36 HP OfficeJets
- 37 HP Scanners
- 38 AGFA Scanner/Cam
- Software Applications
- 40 McAfee Software
- 41 Datatech MYOB
- 42 Omnipage
- 43 Symantec
- 44 Microsoft Applic.
- 45 Microsoft Press
- 46 Microsoft Systems
- 47 Corel Software
- 48 Adobe Software
- 49 Logitech/Adobe Software
- 50 Macromedia/Manacomm
- 51 MAUS Software
- 52 Visio Flowcharting
- 53 Ashton
- 54 SOHO Software
- 55 Inprise Software

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Palm IIIx™

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More of a good thing



The Palm IIIx™ organiser gives you twice the memory of the Palm III™, and an open connector slot for room to expand. New advanced LCD screen technology improves viewing in dim light conditions or bright sunlight.

- Stores approximately:
- 12,000 addresses
 - 5 years of appointments
 - 3,000 to-do items
 - 3,000 memos
 - 400 e-mail messages
 - and lots of third-party applications.

(74373) **\$720**

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Excellent Conduit software to work with the Palm IIIx. Enables users to sync their PalmPilot organizer with common personal info mgt, contact mgt & group scheduling applications.

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Palm III™

Connected Organiser

Award winning!



At just 12 cm tall and 161 grams (batteries and all), it is small enough to fit in your shirt pocket or purse, and powerful enough to keep you organised anywhere you go.

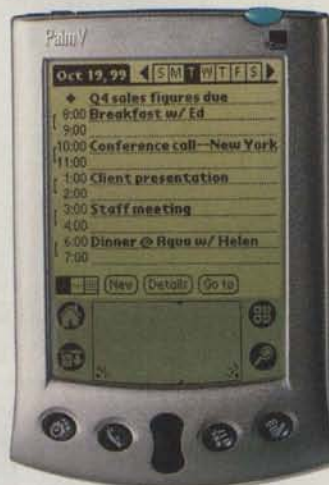
- Stores approximately:
- 6000 addresses
 - 5 years of appointments (approximately 3000)
 - 1500 to-do items
 - 1500 memos
 - 200 e-mail messages
 - and lots of third-party applications.

(59857) **\$595**

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- 6,000 addresses
- 5 years of appointments
- 1,500 to-do items
- 1,500 memos
- 200 e-mail messages
- and lots of third-party applications.

(74294) **\$895**



**Palm Slim
Leather Case**

(63801)

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Page
3

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- 🔌 **6GB HDD**
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| Model | Portégé 3020CT | Portégé 7020CT |
|-----------------|-----------------------|--------------------------|
| Processor | Pentium 300MHz | Pentium II 366MHz |
| RAM Std/Max | 32/96 MB | 64/192 MB |
| Hard Disk | 6GB | 6GB |
| Screen | 10.4" TFT | 13.3" TFT |
| Display | 800 x 600 | 1024 x 768 |
| CD-ROM | No | No |
| Mic & Spkr | Yes | Yes |
| Battery Life | 2.5+ hours | 2+ hours |
| Port replicator | No | No |
| Select bay | No | No |
| DVD capable | No | Yes |
| Weight | 1.3 kg | 1.9 kg |
| Warranty | 3 Years | 3 Years |
| DAA modem | No | Yes |
| Op. System | Win 95/98 | Win 95/98 |
| Rent 3Yrs.** | \$29.84/wk* | \$54.10/wk* |
| Inc Tax | \$3,949 | \$7,159 |
| Part number | (72301) | (72305) |



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Page
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- 64MB RAM
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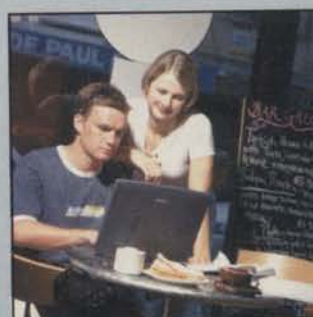
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| Model | NEW! Tecra 8000 333 | NEW! Tecra 8000 333 | Tecra 8000 366 | Tecra 8000 366 |
|-----------------|-------------------------------|-------------------------------|-----------------------------|-----------------------------|
| Processor | Celeron 333MHz | Celeron 333MHz | Pentium II 366MHz | Pentium II 366MHz |
| RAM Std/Max | 64/256 MB | 64/256 MB | 64/256 MB | 64/256 MB |
| Hard Disk | 6.4GB | 6.4GB | 10GB | 10GB |
| Screen | 13.3" TFT | 13.3" TFT | 14.1" TFT | 14.1" TFT |
| Display | 1024 x 768 | 1024 x 768 | 1024 x 768 | 1024 x 768 |
| CD-ROM | 24x max. | 24x max. | 24x max. | 24x max. |
| Mic & Spkr | Yes | Yes | Yes | Yes |
| Battery Life | 3+ hours | 3+ hours | 3+ hours | 3+ hours |
| Port replicator | No | No | No | No |
| Select bay | Yes | Yes | Yes | Yes |
| DVD capable | No | No | No | No |
| Weight | 2.9 kg | 2.9 kg | 2.9 kg | 2.9 kg |
| Warranty | 3 Years | 3 Years | 3 Years | 3 Years |
| DAA modem | Yes | Yes | Yes | Yes |
| Op. System | Win 95/98 | Win NT 4.0 | Win 95/98 | Win NT 4.0 |
| Rent 3Yrs.** | \$39.68/wk* | \$40.78/wk* | \$58.48/wk* | \$60.38/wk* |
| Inc Tax | \$5,250 | \$5,396 | \$7,738 | \$7,990 |
| Part number | (77263) | (77264) | (72308) | (72309) |

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5

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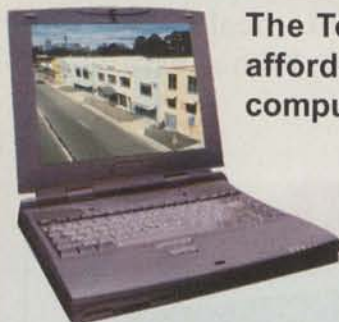
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Independent Types: Satellite 2500

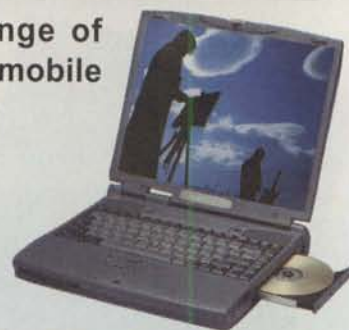


The Toshiba Satellite 2500 Series is a range of affordable small business or home office mobile computers.

From **\$2,995** (77261)

Long Term Rent* T.A.P.** **\$22.63** per week

AMD K6-2 333MHz 4GB HDD
32MB RAM 13.0" DSTN



Movers & Shakers: Satellite 4000

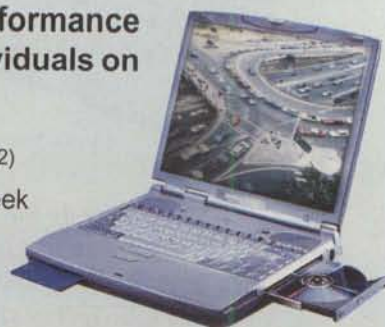


Satellite 4000 Series: affordable high performance mobile computers for high performing individuals on the move.

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Long Term Rent* T.A.P.** **\$42.15** per week

Celeron 300MHz 4GB HDD
64MB RAM 13.3" TFT



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* Rental rates subject to conditions: To Approved Purchasers, Rental figures shown are for 36 month terms. Please call us for latest figures.

| Model | Satellite 2520CDT | Satellite 2540CDS | Satellite 2540CDT | Satellite 4030CDT | Satellite 4060XCDT | Satellite 4080XCDT |
|-----------------|-------------------|-------------------|-------------------|-------------------|--------------------|--------------------|
| Processor | AMD K6-2 300MHz | AMD K6-2 333MHz | AMD K6-2 333MHz | Celeron 300MHz | Pentium II 333MHz | Pentium II 366MHz |
| RAM Std/Max | 64/192 MB | 32/160 MB | 64/192 MB | 64/192 MB | 64/192 MB | 64/192 MB |
| Hard Disk | 4GB | 4GB | 4GB | 4GB | 4GB | 6GB |
| Screen | 12.1" TFT | 13.0" DSTN | 14.1" TFT | 13.3" TFT | 14.1" TFT | 14.1" TFT |
| Display | 800 x 600 | 800 x 600 | 1024 x 768 | 1024 x 768 | 1024 x 768 | 1024 x 768 |
| CD-ROM | 24x max. | 24x max. | 24x max. | 24x max. | 24x max. | 24x max. |
| Mic & Spkr | Speakers | No | No | Speakers | Speakers | Speakers |
| Battery Life | 3+ hours | 2.8+ hours | 2.8+ hours | 3+ hours | 3+ hours | 3+ hours |
| Port replicator | No | No | No | Yes | Yes | Yes |
| Select bay | No | No | No | No | No | No |
| DVD capable | No | No | No | No | No | No |
| Weight | 3 kg | 3.1 kg | 3.1 kg | 3 kg | 3 kg | 3 kg |
| Warranty | 1 Year | 1 Year | 1 Year | 1 Year | 1 Year | 1 Year |
| DAA modem | No | No | No | No | No | No |
| Op. system | Win 95/98 | Win 95/98 | Win 95/98 | Win 95/98 | Win 95/98 | Win 95/98 |
| Rent 3Yrs.** | \$25.45/wk* | \$22.63/wk* | \$29.38/wk* | \$29.76/wk* | \$36.71/wk* | \$40.50/wk* |
| Inc Tax | \$3,369 | \$2,995 | \$3,879 | \$3,929 | \$4,849 | \$5,359 |
| Part number | (30599) | (77261) | (77262) | (72302) | (72303) | (72304) |

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Page
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| 32MB for Portege 3020 | (77228) | \$217 |
| 64MB for Tecra 8000/ Portege 7000/ Satellite 4000 | (29384) | \$350 |
| 64MB for Portege 3020 | (77229) | \$595 |

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| For Satellite 4000/4010/2520CDT and others | (21930) | \$277 |
| For Portege 3010/3020 | (73665) | \$139 |
| For Satellite 4000 Series | (72109) | \$277 |
| For Tecra 8000 | (29358) | \$278 |

TOSHIBA HIGH CAPACITY BATTERY PACKS

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|-----------------------|---------|--------------|
| For Portege 3010/3020 | (72475) | \$278 |
| For Portege 7000/7020 | (66479) | \$438 |

TOSHIBA BATTERY CHARGER

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| For Tecra 8000 | (29357) | \$489 |
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TOSHIBA UNIVERSAL AC ADAPTER

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| For Tecra 8000/Satellite 4000/4010 and others | (44200) | \$134 |
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| For Satellites with TFT Display | (21729) | \$182 |
|---------------------------------|---------|--------------|

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| For Portege 7000/7010/7020 | (65958) | \$1,299 |
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| II For Tecra 750/780/8000 | (51747) | \$729 |
| For Satellite 4030/4060/4080XCDT | (74088) | \$345 |

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| For Tecra 500/550/650/700/750/8000 Series | (25446) | \$1,352 |
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| Leather Bag for A4 Notebooks | (68408) | \$205 |
| Note Prem Mobile Office Koskin Bag | (01761) | \$184 |
| Hard Carrycase for A4 Notebooks | (01762) | \$394 |

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(73463)

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| PII 400MHz | 32x | 8.4GB | (75998) | \$2,399** |
| Celeron A 366MHz | 32x | 4.3GB | (75993) | \$1,539** |
| Celeron A 400MHz | No | 8.4GB | (75992) | \$1,849** |
| Celeron A 400MHz | 32x | 8.4GB | (75999) | \$1,945** |

HP Monitors

HP 15"
Monitor
(72507)
\$417

HP 17"
Monitor
(65211)
\$699

HP 19"
Monitor
(78152)
\$1,159



**Models listed here are base units only. Add 15" Monitor:

HP Vectra
(73463)

\$560

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Latest technology

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| Processor | | HDD | Part # | Price |
|------------------|-----|-------|---------|----------------|
| VLI8 PII 400MHz | CD | 8.4GB | (75838) | \$2,665 |
| VEI8 PII 400MHz | Lan | 4.3GB | (75828) | \$2,255 |
| VEI8 PII 400MHz | CD | 8.4Gb | (75829) | \$2,475 |
| VEI8 PIII 450MHz | Lan | 4.3GB | (75831) | \$3,097 |
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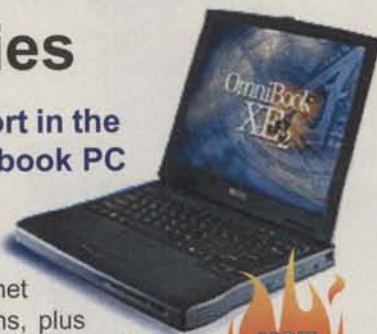
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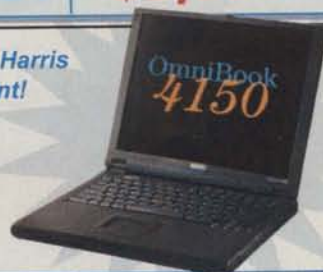
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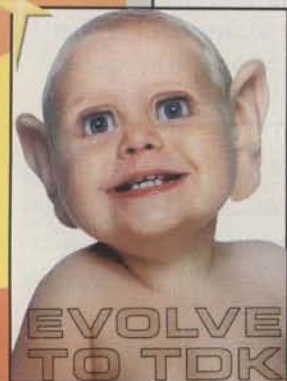


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(72787)

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| DFE-650TX | (56301) | \$214 |
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| DES-815 | (52206) | \$1,159 |
| 16port Fast Ethernet Switch with 12x10BaseT, 3x100Base ports | | |
| DES-1008 | (52207) | \$1,439 |
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| DES-1024 | (76740) | \$2,410 |
| 24 port dual speed 10/100Mb Smart Switch | | |
| DES-3224 | (69457) | \$3,274 |
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- Compact Desktop size



(60558)

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| DE-816TP | (51844) | \$330 |
| 16-port 10Mb Hub with 1x AUI/1x BNC Ports (Rackmount) | | |
| DFE-904 | (72789) | \$215 |
| 4-port 10/100Mb dual speed Hub | | |
| DFE-916DX | (72790) | \$1,059 |
| 16-port 10/100Mb dual speed Hub with Switching | | |
| DFE-2624x | (56303) | \$1,839 |
| 24-port 10/100Mb dual speed Hub with Switching | | |

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(59820)

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| DI-300M | (76742) | \$1,259 |
| Dual speed 10/100Mb ISDN Router. IP, IPX Bridge | | |
| DFM-560E | (65472) | \$172 |
| External 56K Voice/Data/Fax modem Rockwell Chipset | | |
| DFM-560I | (65473) | \$142 |
| Internal 56K Voice/Data/Fax modem Rockwell Chipset | | |

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Take the Work out of Networking

NETGEAR Gigabit Switch

FS509

8 ports 10/100Mbps + 1 port Gigabit
Fast Ethernet Switch



NEW!

\$2,399 (76840)

This high-performance Fast Ethernet Switch provides eight 10/100 Mbps switched ports and a 1,000 Mbps Gigabit Ethernet port. The switched 10/100 Mbps ports are ideal for segmenting networks into small, connected subnets for superior performance, enabling the most demanding multimedia and imaging applications over the network. The Gigabit Ethernet port is designed for connecting to a server where most traffic goes or connecting to the network backbone to access remote resources.

★ Also ask us about NETGEAR GIGABIT NIC ★

NETGEAR Dual Speed Hubs



These Netgear hubs connect multiple PCs to share printers, files, Internet access, and e-mail communications. Mix and

match 10 and 100 Mbps PCs, servers, and peripherals on the same network with ease and without the high cost and complexity of multiple hubs and bridges. All feature easy, plug-and-play installation, Auto-sensing dual speed ports & vista network ports with built-in LEDs.

DS104 4-port Slimline (70795) **\$227**

DS108 8-port Slimline (18755) **\$366**

Full connectivity among devices. Compact, sturdy, metal case.

DS516 16-port Stackable (64389) **\$998**

DS524 24-port Stackable (69474) **\$1,163**

Rackmountable, expandable from 8 to 192 users.

NETGEAR 10/100Mbps Fast Ethernet Switches

Ask us about NETGEAR Integrated Fibre Switches

FS104 4-port Slimline (55171) **\$549**

FS108 8-port Slimline (70905) **\$626**



4 or 8 switched 10/100 Mbps ports, auto-speed and duplex mode sensing. Versatile and compatible. Compact and easy to install. Vista jacks with built-in LEDs. From the worldwide leader in hubs and switches.

FS516 16-port Slimline (60522) **\$1,995**



Provides powerful, network center performance with all 16 ports capable of 10 or 100 Mbps, half- or full-duplex operation, automatic speed sensing. Ideal for segmenting networks into small, connected subnets. Vista network ports with built-in LEDs.

FS524 24-port Slimline (77549) **\$1,699**

Provides powerful, network center performance with all 24 ports capable of 10 or 100 Mbps, half- or full-duplex operation, automatic speed sensing. Ideal for segmenting networks into small, connected subnets. Vista network ports with built-in LEDs.

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RM356 Analog Router

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RT328 ISDN Router

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(68900) **\$699**



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(53456)



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Page

21

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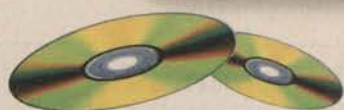
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(52790)

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(75547)

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Page

22

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- Vertical in-ear stereo headphone with adjustable microphone boom
- Ideal for notebook computer users



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JULY
Page
23

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(71582)

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clik!

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Get started with the Zip starter kit! It's a portable parallel
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zip

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JULY
Page
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The super-fine-pitch aperture grille presents distinctively sharp and clear images with crisply rendered detail. The all-vertical structure results in bright, vibrant colours. Trinitron CRT's are vertically flat - straight lines always appear straight from any angle and from corner to corner.



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| Sony Trinitron® CRT | 100ES | 200ES | 200GS | 400PS | 500PS |
|---------------------|-----------------|-----------------|-----------------|------------------|-----------------|
| Size | 15" | 17" | 17" | 19" | 21" |
| Max. Resolution | 1280x1024 @60Hz | 1280x1024 @60Hz | 1600x1200 @60Hz | 1600x1200 @ 75Hz | 1600x1200 @85Hz |
| Our part number | (66055) | (58205) | (58798) | (57451) | (58544) |
| Price | \$499 | \$849 | \$1,099 | \$1,710 | \$2,798 |

Digital Mavica MVC-FD91

3.5" Floppy Disk Digital Cameras Not just photos, but movies stored on a Floppy Disk!!

Digital Mavica MVC-FD83



This SLR Style camera records up to 40 XGA (1024x768) or VGA (640x480) resolution still photos, PLUS, you can also record up to 60 seconds of full-motion video, all on a standard 3.5" Floppy Disk!! Packed with features including 14x Optical Zoom, Steady shot, InfoLithium™ rechargeable battery and charger, and bundled with MGI Photosuite™ to enhance that perfect photo!

\$2,675

The MVC-FD83 records still shots at the same high resolution as the MVC-FD91, with up to 60 seconds of full-motion video straight on to a Floppy. Features a 3x Optical, 6x Digital Zoom, Auto Focus, 4 Digital Picture Effects, built-in auto intelligent flash, self timer (10 secs) and patented Sony InfoLithium™ rechargeable battery and charger.



(76801)

\$1,949

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Speakers

Pair of monitor mountable speakers. Looks good weather mounted on the side of your monitor or placed on the desktop. Crisp rich bass is guaranteed. Total output power 50W.

SONY SRS-PC51

(76624)

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Speakers

Provides big sound matched by rich resonant bass. A dynamic 3 piece system offering total output power of 300W PMPO. Two Audio inputs, mixing function and headphone jack.

SONY SRS-PC300D

(30906)

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When only the best
in Multimedia quality
sound is what
you want for
your PC!



Speakers

These desktop speakers include intelligent Bass boost feature, sound mixing and "surround sound" switch. Offers total output power of 100W.

SONY SRS-PC45

(71991)

\$153



JULY
Page
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PRICE
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(71211)

- USB for true Plug & Play performance
- Full automatic control white balance
- Windows 98 WDM compliant
- Flicker-free picture mode under 50 and 60Hz light environment
- High frame rates: CIF up to 15 fr/sec, QCIF up to 24 fr/sec
- Video-mail application software included
- Integrated microphone and audio circuitry for live audio via USB
- LED shows the camera is active



Philips Brilliance TFT 15.1" LCD Monitor

This monitor is packed with features. For power users it has an option for a USB hub, with 4 downstream ports for easy connection of any device to your computer. With a super 15" viewing area, and a super tiny footprint, this monitor is perfect for any application. It has no electro-magnetic emissions and complies fully with the EPA Energy Star Standards.

- Windows '98 compliant
- Small 17.6 cm (7") footprint; weighs only 5.2 kg
- Display comparable to a 17" CRT monitor, with even better picture clarity and geometry

151AX (22421)

\$2,190

MMS130

Active 2x3-watt (RMS) speakers, 80-Watt PMPO. Magnetically shielded. Convenient function controls, including a rotary volume control.



Analogue Stereo
Speaker
MMS130 (72841)

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PHILIPS Speakers

DSS350 USB



Signal to noise ratios of 98dB & sampling rates up to 55KHz. Digital audio streaming under Windows® 98. Dynamic Bass Boost. Powerful 2-Way 30-Watt speakers with one 4" bass driver and one 2" tweeter.

Digital Multimedia Speaker

(72845) **\$229**

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Speaker MMS230
(72843)

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DSS370 USB

A powerful combination. Super hi-fi audio reproduction through use of USB. Signal to noise ratio up to 98dB, sampling up to 55KHz.



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with
SubWoofer
(72847)

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MMS280

MMS230 + Active high power subwoofer. Frequency range 35-150Hz 30-Watt RMS, 60-Watt music power, 360-Watt PMPO.



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Speaker with
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(72844)

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27

Video Multimedia

MPEGator USB



(75947)

\$1,219

World's first external MPEG 1 Encoder for USB. MPEGator USB is a portable unit that allows you to capture video from a variety of sources in MPEG format. MPEGator USB also features Video Conferencing, High resolution uncompressed still image capture and is bundled with MPEG Editing software, VideoMail and other MPEG software tools.

Features:

- Fully compliant with Video CD standards.
- Full motion MPEG1 video digitising and encoding for Video CD's
- Synchronised Real-Time MPEG Audio Compression
- Real-Time compressed video preview
- Video bitrate range: 250-3000 Kbits/sec
- Audio bitrate range: 32-384 Kbits/sec
- Video Resolution: up to 352 x 288 (PAL) / 352 x 240 (NTSC)

CapView

CapView USB Video Conferencing, Video Capture, Video Editing & VideoMail solution. Works with any Camcorder, VCR for video input. The Software provided allows you to record/edit and e-mail video and audio messages, compile and create greeting cards. Features: Capture up to 30 fps in CIF format (352 x 288 Pixels). Supports hardware & software snapshot up to 640 x 480. Scalable video window size from 80 x 60 up to 640 x 480. Supports TWAIN interface for image editing applications. Ulead Video Studio 3.0 worth \$199.



(75943)

\$149

Video Office

World's first Real-Time Software MPEG 1 Encoder. The VideoOffice conferencing kit, which includes Camera and Capture Card (PCI or PCMCIA) allows desktop users and notebook road warriors to create video contents for presentations, personal or business web-sites, and video CD's without expensive hardware.



Features:

- Produces industry standard MPEG1 video and audio
- Compatible with all existing video editing and conferencing software
- Converts any AVI clips to MPEG1 formats
- Composite and S-Video Inputs
- Video Resolution: motion video up to 320 x 240 (NTSC or PAL)
- Video Resolution: stills up to 640 x 480 (NTSC) or 768 x 576 (PAL)
- Video Frame rate: up to 30 fps (NTSC) or 25 fps (PAL)
- Ulead Media Studio Pro 2.55

RoboCam USB



(75942)

\$180

The latest in high-resolution cameras, USB RoboCam, allows users to Video conference or capture in full motion or single frame snap shots.

Features: Captures up to 30 fps (352 x 288 Pixels) full motion video. Supports hardware and software snapshots up to 640 x 480. Supports TWAIN interface for image editing applications. Ulead Video Studio 3.0 worth \$199.



For Desktops (75945)

\$639



For Notebooks (75946)

\$699

New Digital Cameras, CD-R/RW

Kodak DC 200 Plus



- 1 Million pixels max. resolution
- No zoom
- 4MB memory card
- Serial and Video cable
- Date stamp option
- Focus Range: 0.68m to infinity
- Software: Picture Easy 3.0
- 37mm threads accept optional lenses

(74408)

\$759

Kodak DC 240 Zoom



- 1.3 Million pixels max. resolution
- 3x optical zoom, 2x digital zoom
- 8MB memory card
- Serial, USB and Video cable
- Time and date stamp option
- Focus Range: 0.5m to infinity
- Software: Picture Easy 3.0, Adobe PhotoDeluxe & Pagemill
- Automatic white balance and exposure lock

(74409)

\$1,229

Kodak DC 265 Zoom



- 1.6 Million pixels max. resolution
- 3x optical zoom, 2x digital zoom
- 16MB memory card
- Serial, USB and Video cable
- Text, time and date stamp option
- Focus Range: 0.3m to infinity
- Software: Picture Easy 3.0, Adobe PhotoDeluxe & Pagemill
- New "super" image compression setting for internet transfer
- Audio record and playback

(74410)

\$1,699

The Power to **BURN**

Kodak 4802 CD-R / RW Writer



- 8x Read, 4x Write, 2x Re-Write
- ATAPI Enhanced IDE Interface
- Disc-at-Once, Track-at-Once, Multisession
- Software: WinOnCD, Packet CD and Gazo Personal Image Warehouse software
- Hook up through your sound card to a HiFi system for audio recording from any source
- Windows 95/98/NT Compatible
- Large 2MB buffer
- Video CD capable

(74411)



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| (72231) | Kodak InkJet T-Shirt Transfer Media | \$ 44 |
| (72233) | A4 InkJet Photo Paper Pic Easy 15 shts | \$ 33 |
| (72232) | A4 InkJet Photo Greeting Card 20-pck | \$ 33 |
| (68401) | 6"x4" InkJet Snapshot paper 36 shts | \$ 19 |



KODAK CAMERA ACCESSORIES

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| (62676) | Photo Memory 20MB (suit 220 & 260) | \$ 319 |
| (62677) | Photo Memory 32MB (suit 220 & 260) | \$ 385 |
| (72889) | Photo Memory 48MB (suit 210/220/260) | \$ 459 |

KODAK CD MEDIA

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| (53993) | Recordable CD Media 10-pack | \$ 28 |
| (72236) | ReWritable CD Media Single | \$ 20 |
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DC210 Plus

- 1 Million pixels.
- 2x optical zoom.
- 8MB memory card.
- Date stamp option.
- Focus range: as close as 20cm to infinity.

(67283)

\$975



DVC323

USB Video Conferencing Camera

The fast, easy and FUN way to capture and share pictures & videos! Up to 640x480 pixels, 30fps (58061)

PRICE DROP

\$275

JULY

Page

29

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7 Days

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Lexmark

Black toner
for
OptraColor
1200

\$205

(65707)

M, C or Y
toner for
OptraColor
1200

\$279

(65708, 75295
or 65709)

Photo-
conductor

\$199

(65710)

Transparen-
cies, A4, 50
sheets

\$109

(65712)

2nd Paper
Drawer
Assembly
for

OptraColor
1200

\$668

(65702)

Call Harris
Technology
on (02) 9925
9925 for
more options
or have a
look at the
Web Direct
Link.

Printing Made Easy



LEXMARK OptraColor 45

A4 Colour

A3 Colour

Supports over-sized A3!

Enjoy professional colour in a big way

The OptraColor 45 is the wide format printer that offers workgroups the ultimate combination of speed, image quality, versatility and affordability. From over-sized A3 prints and CAD/CAM applications to colour spreadsheets and more, it's the printer that won't ask you to compromise.



(65704)

\$1,375

**HOT
NEW PRICE**

LEXMARK Optra SC 1275

A4 Colour

Give your business
image a boost with
affordable, high
quality colour

With 16MB RAM (44304)

\$4,399

With 32MB (44306) **\$4,857**

The Optra SC 1275 not only provides affordable, 600 dpi with 1200 IQ colour output for all your business needs, it also races through letters, spreadsheets, presentations and other documents providing laser sharp black output. With its quick 12ppm black/3ppm colour engine & high performance Intel 32-bit RISC processor, you'll benefit at every level of your business.



**HOT
NEW PRICE**

LEXMARK OptraColor 1200

A4 Colour

A3 Colour

The new
standard in
colour
printing

(65469)

\$9,580

The Lexmark OptraColor 1200 is a dream come true for desktop colour users. A true CMYK in-line LED printer with a massive 200MHz RISC processor and up to 128MB RAM, it makes fast work of your most demanding needs. It speeds away at 12ppm colour and mono A4 and 6ppm colour and mono A3. From multiple originals of an A4 report to A3 proofs, the OptraColor 1200 is as good as it gets.



**HOT
NEW PRICE**

LEXMARK Optra E310

A4 Mono

The faster, smaller,
smarter personal
printer

(77799)

\$849

The newest member of the Lexmark family, the Optra E310 is perfect for small groups or individual use. The Optra E310 prints at 600x600dpi and 1200IQ at 8ppm. With its 67MHz RISC processor the Optra E310 has a fast time to first page and comes standard with a built-in USB port.



LEXMARK Optra K 1220

A4 Mono

The multi-
purpose
desktop printer
for cost-
conscious
businesses

(64495)

\$1,139

The Optra K 1220 is designed to optimise your efficiency with up to 66MB RAM and 12ppm. This highly versatile printer features a standard 200 sheet input tray (expandable to 740 sheets). Add optional networking facilities, and you have the setup to optimise your workgroup printing.



**HOT
NEW PRICE**

JULY
Page
30

**HARRIS
TECHNOLOGY™**

Pricing** and specifications herein are subject to change without notice



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or T/T. Call for details.

Canon

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Web
Direct

www.ht.com.au/cat/canon

You can on a Canon, can do!



Canon BJC-5000
Colour Bubble Jet Printer

(20756)

A3 Capable
1440x720dpi

\$519

- High resolution: 1440x720dpi
- Prints up to A3. Great for full bleed A4! Also prints banners.
- Print speed: mono HQ 7.5ppm, colour HQ 2.85ppm
- PhotoRealism
- Laser sharp black text
- Transparencies, high resolution paper, T-shirt transfers etc.



Canon BJC-7100
Colour Bubble Jet Printer

(72294)

1200x620dpi

\$499

- High resolution: 1200x600dpi
- Print speed: mono 8ppm, colour 5ppm
- PhotoRealism
- Laser sharp black text
- Transparencies, high resolution paper, T-shirt transfers, glossy photo cards etc.
- Water resistance even on plain paper

BJC-265SP



Up to 4ppm mono.
720x360dpi capable.
Banner printing.
(76009)

\$155

BJC-4310 SP



720x360dpi, up to 4.5ppm mono
(68730)

\$198



Canon PowerShot A5 Zoom
Pocket Size Digital Camera

-2.5x Zoom
-2" LCD Viewfinder
-Image size: 1024x768 or 512x384 pixels
-Auto white balance, self timer, flash with red-eye reduction, macro mode, slow shutter mode, continuous shooting, night mode for beautiful evening shots

- Software: SlideShowMaker, PhotoStitch(panoramas), TimeTunnel (organize images chronologically in visual presentations), Ulead PhotoImpact (retouching, special effects), ZoomBrowser (easy to view & find images)
- Includes 8MB card, stores approximately 230 images

PRICE DROP

(73886)

\$1,089



USB

Canon CanoScan FB 620U
Colour Flatbed Scanner

(77674)

\$410

- USB Plug 'n Play convenience for Windows 98 equipped PCs
- Selectable resolution: 25 to 2400dpi
- True Optical resolution: 600dpi
- Comes with Omnipage LE OCR and photo imaging software

Also available: Parallel version FB 620P (68734) **\$259**
Also available: SCSI version FB 620S (73885) **\$405**



USB

Canon CanoScan FB 320U

- USB for PCs with Windows 98
- Selectable resolution: 25 - 2400dpi
- Optical Resolution: 300 x 300dpi

(77673) **\$309**
Also available: Parallel version FB 320P (68733) **\$189**

BJC-50



Portable Printer
720x360dpi
(63560)

\$587

BJC-80



Portable Printer
Up to 720dpi
Optional scanner head
(52258)

\$334



The workgroup workhorse.
Fast, versatile, efficient.

(63563)

\$1,735

Canon LBP-1760 Laser Printer

- Resolution: Up to 1200dpi
- Speed: Up to 17ppm
- Processor: Intel i80960HD 50MHz RISC
- Memory: 4MB; Memory Reduction Technology built-in
- Language: PCL 6 (PCL XL 5e emulation). (Adobe PostScript 3 optional)
- Paper input: 500-sheet cassette, 100-sheet multi-purpose tray (Pictured with optional extra 500-sheet cassette)

JULY

Page

31

Sales 1300 13 9999

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E-mail sales@ht.com.au

**Ground floor
275 Alfred St
North Sydney**

Tektronix

For the latest info & pricing see this Weblink address!

Web
Direct

www.ht.com.au/cat/tektronix

For Phaser 840:

Colour Ink Sticks (C,M or Y) 2-pack (71872, 71873, 71874)

\$194



Colour Ink Sticks (C,M or Y) 5-pack (71869, 71870, 71871)

\$399

Paper Tray (71905)

\$234

Transp. / Label Tray (71906)

\$234

16MB Memory (71844)

\$439

32MB Memory (71845)

\$875

64MB Memory (71846)

\$1,746

A4 Premium Transparencies 50 sh. (71902)

\$139

Business Laser Printing

Phaser 840 Colour Printer



Tired of 256 shades of grey?

Get the competitive advantage of colour without the slow speeds, high operating costs, and complex maintenance that come with most colour lasers.




Now, there's a brand new alternative.

The Phaser 840 solid-ink laser printer. A winning combination of easy, cost-effective colour printing, quality, and colour print speeds over twice as fast as the typical colour laser! The Phaser 840 colour printer makes life simple and is remarkably cost effective for any workgroup with a colour job to do. Set up is breeze with its "plug-and-print" right-out-of-the-box design.

And.. **free black ink** means you can add colour to documents and still keep the same low cost-per-page as a monochrome laser printer.

Colour is now affordable!



| Model Tektronix |  840/N |  840/DP |  840/DX |
|---------------------------------------|--|---|---|
| Resolution | 1000 dpi | 1200 dpi | 1200 dpi |
| Memory Standard/Max | 32 MB (128 MB) | 64 MB (128 MB) | 128 MB (128 MB) |
| Built-in Hard Disk | Optional | Optional | 2 GB Hard Disk |
| RISC PowerPC Image Processor | 133 MHz | 133 MHz | 133 MHz |
| Max. Speed Fast Colour | 10 ppm | 10 ppm | 10 ppm |
| Max. Speed Standard | 6 ppm | 6 ppm | 6 ppm |
| Max. Speed Enhanced | 3 ppm | 3 ppm | 3 ppm |
| Max. Speed High Resolution/Photo | - | 2 ppm | 2 ppm |
| Pipeline Printing | Optional | Standard | Standard |
| Job Accounting | 50 Jobs | 500 Jobs | 5,000 Jobs |
| Check Print Preview | Optional | Optional | Standard |
| Remote Printing | Standard | Standard | Standard |
| PDF Direct Printing | Optional ¹ | Standard ¹ | Standard |
| Collation Printing | Optional ¹ | Standard ¹ | Standard |
| Duplex Built-in Automatic | Optional | Standard | Standard |
| Main Paper Tray 200-sheet | Standard | Standard | Standard |
| Hi-capacity Tray 500-sheet each (two) | Optional | Optional | Standard (one) |
| Part number | (71839) | (71840) | (71841) |
| Price | \$5,899 | \$7,285 | \$9,890 |

¹Requires optional hard disk drive.

Call Harris Technology on (02) 9925 9925 to ask about Tektronix **A3** colour lasers!

Great value from only **\$10,959** (23071)

JULY

Page

32

HARRIS TECHNOLOGY™

Rent: Short or long term. Finance options available: IBM Easylease, AGC.



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Makes bright ideas look brilliant



EPSON STYLUS COLOR 900

The fastest A4 colour inkjet printer in its class

The fastest colour inkjet in its class at 12ppm - an amazing one page every five seconds. Ideal for the business environment. It also offers flexible connectivity solutions, including Universal Serial Bus (USB) for Windows 98.

- Up to 12ppm mono, up to 11.7ppm colour
- Fully Network capable
- EPSON Ultra MicroDot™: world's smallest ink droplet
- High capacity black ink cartridge for volume printing
- 1440dpi print resolution, enhanced EPSON Variable-Sized Droplet Technology

* RRP Pricing. Please check Web Direct for latest price!

\$849*

(74351)



EPSON STYLUS PHOTO 1200

The ultimate A3+ Photo Reproduction Quality colour printer

Perfect for graphic artists and professional photographers. Combines EPSON's 1440 dpi PerfectPicture Imaging System with a 6-colour QuickDry™ ink palette and A3+ (329 x 483mm) paper handling. This means you can now produce full bleed A3, Photo Reproduction Quality images complete with crop/registration marks.

- A3+ Photo Reproduction Quality printing
- 6 colour QuickDry™ inks, Variable-Sized Droplet Technology
- Parallel, USB serial interfaces, Win 95/98, NT 4.0 compatible

* RRP Pricing. Please check Web Direct for latest price!

\$1,049*

(74352)



EPSON EPL-N1600 Laser Printer

Grows with your business

High class performance printing for workgroups or demanding stand-alone users, with options to provide freedom to upgrade as your business grows.

- 1200dpi with MicroGray 1200 and BiRI Tech, speed up to 16ppm
- 8Mb RAM, expandable to 40Mb, 150Mhz processor.
- Up to 3 different paper sources - 1 x 250 sheet cassette, 1 x 80 sheet multi-purpose feeder and an optional 500 sheet cassette, offering 830 sheets total paper capacity.
- Optional network connectivity

\$1,995

(74388)



EPSON GT-7000 Scanner

The scanner that allows you to scan at the touch of a button!

36-bit colour SCSI scanner with an optical resolution of 600 x 1200 dpi. It has a maximum output resolution of 9600 dpi and delivers more than 68 billion colours. With the optional Film Adapter, the GT-7000 can scan negatives and slides. The optional Automatic Document Feeder lets you scan single-sheet documents while the scanner is unattended. Software included: Xerox TextBridge Classic, Adobe PhotoDeluxe, Adobe PageMill, EPSON Personal Copy, EPSON Photo Sheet.

SCSI: (72234)

\$410

USB: (76834)

\$410



More from EPSON

**Black ink
cartridge
for Stylus
440/640**

\$39

(70948)

**Black ink
cartridge
for Stylus
740**

\$45

(70091)

**Tri colour
ink
cartridge
for Stylus
440/640/
740**

\$45

(70092)

**See the
Web Direct
Link for
others.**

JULY

Page

33



HP Laser Printers

Colour



HP 2000C Professional Series Colour InkJet

10ppm mono
A4, 4ppm
colour A4,
600dpi,
2MB RAM

From (69484)

\$1,344



HP 2500C Professional Series Colour InkJet

A3 capable!
9ppm mono
A4, 7ppm
colour A4,
1ppm colour
A3, 600dpi,
4MB RAM

From (70725)

\$2,097



HP Colour LaserJet 4500 Series

16ppm mono,
4ppm colour,
600dpi, 32MB
RAM

From (70356)

\$5,343

HP LaserJet 1100 Printer

HP's JetPath technology allows you the flexibility to expand the HP LaserJet 1100 printer into an All-in-One performer when your business needs grow. Crisp, sharp 600dpi laser printing. 8ppm print speed. 2MB RAM.



(70095) **\$789**

HP LaserJet 1100A Printer-Copier-Scanner

If your current business needs require the HP LaserJet 1100 with copying and scanning capabilities, move up to the LaserJet 1100A. Printing, copying and scanning: all-in-one. Make laser copies at the touch of a button, even without the PC turned on. Scan resolution 600dpi enhanced, 300dpi optical.

(70096) **\$949**

HP LaserJet 2100 Series

All models feature:

- 1200dpi resolution • 10ppm print speed • 60MHz processor • 350-sheet capacity • 15,000 page monthly duty cycle • Excellent performance



HP LaserJet 2100

A fast flexible laser with room to grow.
(EIO, PCL 6, 4MB RAM)

(72291)

\$1,395



HP LaserJet 2100M

A fast flexible laser with PS and PCL.
(EIO, PCL 6, 8MB RAM)

(72292)

\$1,599



HP LaserJet 2100TN

A complete network printer.
(EIO, PCL 6, 8MB RAM, additional 250-sheet feeder,
HP JetDirect print server installed)

(72293)

\$1,899



HP LaserJet 5000

16ppm,
100MHz,
1200dpi,
4MB, prints
up to A3.

From: **\$2,749** (60548)



HP LaserJet 8000

24ppm,
133MHz,
1200dpi, 16MB,
print/duplex up
to A3.

From: **\$4,578** (60551)

HP LaserJet 4050



More yes with less stress

What's new?



- ✓ 2GB Hard Drive Option
- Enhanced productivity features (only available with Hard Drive): Private Printing, Quick Copy, Proof & hold function, Infra Red Port standard on all models, E-form solutions.
- ✓ Faster 133 Mhz processor
- ✓ Double the memory of the LaserJet 4000 series
- ✓ 1200 dpi at full engine speed (16ppm)
- ✓ 10/100 base TX JetDirect card on N & TN models

| Model: | 4050 | 4050N | 4050TN |
|-----------------|----------------|----------------|----------------|
| Input capacity: | 1x100,1x500 | 1x100,1x500 | 1x100,2x250 |
| RAM: | 8MB | 16MB | 16MB |
| Network: | capable | ready | ready |
| Part number: | (77443) | (77445) | (77446) |
| Price: | \$2,299 | \$2,870 | \$3,434 |

HP DeskJet Printers

Order on-line and get
even lower pricing!

HP DeskJet 810C

Brilliant photo-quality results for a great price



NEW!!

**USB &
PARALLEL**

(77961)

\$390

- Black: 600x600dpi, 6.5ppm
- Colour: HP PhotoREt II, 4.5ppm
- HP ColorSmart II
- Hassle-free printing on many paper types and sizes, including envelopes, greeting cards and banners
- Laser quality black text and photo-quality colour on any paper
- Exclusive HP Ink dry fast for smudge-resistant text & photos
- Easy product setup & operation
- Quiet, compact, durable design
- Backed by HP quality and reliability
- One parallel and one USB port

See
www.ht.com.au/cat/hp
not only for information and
pricing on other HP printers, but
also for HP inkjet papers,
inks, toners, etc.



HP DeskJet 895Cxi



Black:
600x600dpi,
10ppm.
Colour: HP
PhotoREt II,
6ppm.
ColorSmart II.
Networkable
with optional
JetDirect
print server.
USB & Parallel.

\$790
(70705)

**HP Iron-on
transfers**
10 sheets A4

\$29
(52818)

**HP Glossy
greeting
card paper**
10-pack

\$18
(70192)

**HP Premium
paper**
200 sheets A4

\$39
(19172)

**HP Premium
glossy paper**
50 sheets A4

\$82
(24427)

**HP Premium
photo paper**
15 sheets A4

\$18
(54010)

HP DeskJet 695C

Easy to use -
great quality

- HP PhotoREt Technology
- Black: 600x600dpi, 5ppm
- Colour: 600x300dpi, 1.7ppm
- Dual cartridge
- HP ColorSmart II
- New improved driver - Windows 3x/95/NT 4.0
- Photo capable with optional Photo Head
- New super economy mode



(66260)

\$258

HP DeskJet 710C



Do you dream
in colour?

- Black: 600x600dpi, 6ppm
- Colour: HP PhotoREt II, 3ppm
- 100 sheet paper tray
- Quiet operation
- Photo-quality colour for home or office
- Handles many types of paper

(68905)

\$329

HP DeskJet 880C

Super-fast,
stunning print quality
on plain paper

- Black: 600x600dpi, 8ppm
- Colour: HP PhotoREt II, 5ppm
- Poster and hand-out printing
- USB and parallel interface
- Black text more crisp and laser-like than ever
- Photo-quality colour

**PRICE
DROP**

**USB &
PARALLEL**



(72920)

\$479



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your galaxy to buy Harris
Technology products.
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**HP
OfficeJet
710**



**\$100
Cash Back***

Prints, faxes,
scans &
copies all in
colour
(71269)

\$965

**BUY the
OfficeJet
710 and
receive
the Party
Pack
FREE!!
Value \$56**



The Party Pack
includes:
C1816A photo
cartridge, 6
sheets of HP
Premium Photo
paper, 10 sets of
HP greeting
cards and
envelopes, 1
continuous stack
of 10 sheets of
banner paper.
Offer valid while
stocks last.
(62586)

The HP "All-in-One" Series

HP LaserJet 3100



The HP LaserJet 3100 is a
versatile business tool that
delivers convenient printing,
faxing, copying and
scanning capabilities in
a single device.

**\$100
Cash Back***

Printer • Copier • Scanner • Fax

| | | |
|--------------------|-------------------|-------------------|
| Printer: | Print resolution: | 600x600dpi |
| | In/output trays: | 100 sheets |
| | Print speed: | 6ppm |
| Fax/PC Fax: | Fax memory: | 150 pages |
| | Speed dials: | 175 |
| Copier: | Max copies: | 99 |
| | Zoom: | 50-200% |
| Scanner: | Scan resolution: | 600 enh./300 opt. |

(58566)

\$1,349

HP OfficeJet 635

Completing your work in colour is now convenient
and easy. The HP OfficeJet 635 prints, scans and
copies in colour, plus it's a plain paper fax. You get
four essential office devices in one powerful
package!



**\$100
Cash Back***

Colour Printer • Colour Copier • Colour Scanner • Fax

| | | |
|--------------------|-------------------|---------------------------------------|
| Printer: | Print resolution: | 600x600dpi black 600x300dpi colour |
| | In/output trays: | 100 sheets |
| | Print speed: | 5ppm black 2ppm colour |
| Fax/PC Fax: | Fax memory: | 150 pages |
| | Speed dials: | 65 |
| Copier: | Max copies: | 99 |
| | Zoom: | 50-200% |
| Scanner: | Scan resolution: | 1200 enh./300 opt. |

(55544)

\$779

HP OfficeJet Pro 1170C

The All-in-one, easy-to-use colour printer, colour
copier and colour scanner that provides professional
quality and performance.



**\$100
Cash Back***

Print, copy, scan, all in colour!

| | | |
|-----------------|-------------------|---------------------------------------|
| Printer: | Print resolution: | 600x600dpi black 600x600dpi colour |
| | Print speed: | 9ppm black 5ppm colour |
| Copier: | Max copies: | 50 |
| | Zoom: | 25-400% |
| Scanner: | Scan resolution: | 1200 enh./300 opt. |

(63098)

\$1,365

*Customer must fill in claim form & attach
their proof of purchase to receive their \$100
cashback. Promo ends 31/7/99.



The **1175C** model also features
integrated PC faxing and has a 30-
page automatic document feeder for
unattended copying or scanning.

(63099)

\$1,760

JULY

Page

36



Monitor... Stunning Visual Quality!!

Silicon Graphics 1600SW Flat Panel Monitor

Build your own
configuration
at our Web Direct
Link:
[www.ht.com.au/
cat/sgi](http://www.ht.com.au/cat/sgi)



- ➔ High resolution 17.3" 1600x1024 LCD monitor
- ➔ 16.7 million colours (24-bit true colour; no dithering)
- ➔ Unique SuperWide screen format displays two full pages of information
- ➔ Ultrafine dot pitch (0.23mm) for professional quality image editing (110dpi)
- ➔ Fast pixel response for video playback
- ➔ Supports ColorLock colour calibration
- ➔ Dimensions (incl. base): 17.8"W x 18.3" H x 7.3" D, 7.2Kg

Monitor 17" with PCI Graphics Card

(75447)

\$5,829

Rent* T.A.P.** for **\$44.05** per week over 3 years

Monitor 17" with AGP Graphics Card

(75448)

\$5,829

Rent* T.A.P.** for **\$44.05** per week over 3 years

Silicon Graphics 540 Visual Workstation



- Single Pentium III Xeon CPU 500MHz
- 1 x 9.1GB Ultra 2 SCSI HDD
- 32 x CD-ROM EIDE
- 256MB ECC SDRAM
- USB Keyboard and PS/2 3 Button Mouse
- Windows NT Workstation 4.0
- Stereo Speakers and adapter
- 3 Years On-site Warranty, Next Business Day

Call or see Web Direct for
other configurations

With 17.3" Flat Panel Monitor:

\$21,239

With 17" CRT Monitor:

\$16,869

SGI Systems have been designed with these applications in mind

3D Modelling: Creating & manipulating complex 3D models call for staggering amounts of system resource which only SGI systems can deliver.

Image editing and Manipulation: High resolution 2D images are becoming popular in DTP, only SGI systems have capabilities to handle this.

Video Editing: Silicon Graphics 540 Visual Workstation supplies the professional video interfaces & high systems bandwidth needed to work with un/compressed analog & digital video in real time.

Analysis: Silicon Graphics 540 Visual Workstation provides analytic capabilities far beyond most personal workstations. No other system has the power of an SGI.

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subject to
Approved
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Rental
figures
shown are
for 36
month
terms.
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figures. We
can obtain
fast
approvals.

COMPAQ



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Mobile Computing Solutions

Compaq Carepaqs

Upgrade your warranty - pay a little extra for complete peace of mind!

Deskpro 3
Yr Standard
On-Site 8x5
(71098)

\$285

Armada
1500/1700 3
Yr RTB 8x5
(77991)

\$215

Armada
3000/6000/
7000 3Yr
OS 8x5
(77992)

\$140

*Rental rate for business use, includes stamp duty and FID for NSW. T.A.P.

New**
pricing
available
while stock
lasts.

Get Organised



COMPAQ Aero 2130

The Compaq HandHeld Solutions - Today's fast-paced business world calls for computing solutions that are increasingly trim, mobile, economical and effective. Professional business users are looking for small mobile information management appliances such as hand-held or palm-size computers - tools they can use on the road and in the office.

- Colour TFT Palm Size PC
- Easy to read in any environment from bright sunlight to total darkness
- High-resolution screen
- Rechargeable Lithium-Ion Battery
- Ergonomic design for efficient single-hand operation
- Audio - One touch record button



(77960)

\$1,259



Lightweight



COMPAQ Armada 1750

- 333MHz Mobile Pentium II
- 64MB SDRAM, max 192MB
- 13.3" CTFT 1024x768
- 4MB SGRAM
- Removable floppy & 6.4GB hard drives
- 24X Max CD-ROM
- Integrated V.90/K56flex modem
- Integr. AC adaptor
- TouchPad
- Windows® 95

(73064)

\$4,399**

Rent* **\$33.24**
per week over 3
years, T.A.P

COMPAQ Armada 1500C

- Celeron 366MHz
- 32MB SDRAM, max 160MB
- 12.1" CSTN 800x600
- 2MB SGRAM
- Removable Floppy & 4.0Gb hard drives
- 24X Max CD-ROM
- External AC Adaptor
- TouchPad
- Windows® 95

(78188)

\$2,679**

Rent* **\$20.25**
per week over 3
years, T.A.P

Powerhouse



COMPAQ Presario 1685

The Presario 1600 Series is the ultimate all-in-one notebook packed with advanced technology for serious work and serious play.

- AMD K6-2 400MHz Proc. with 3D Now Technology
- 4.3GB Ultra DMA HDD
- 64MB SyncDRAM
- 512KB L2 Pipeline Cache
- 12.1" TFT Active Matrix
- 8MB Video Memory
- MPEG full-motion playback
- Integrated V.90/K56flex modem
- 24X CD-ROM drive
- 3.5" 1.44Mb DD
- 2X AGP, Accel. 3D
- Windows® 98 & various other software pcks
- JBL Pro Audio System



NEW!

(77952)

Rent* **\$29.40** per week over 3 years, T.A.P

\$3,890**

See Web Direct for pricing and availability on options

JULY

Page

14

HARRIS TECHNOLOGY™

Pricing** and specifications herein are subject to change without notice



All prices include sales tax & subject to change w/o notice



Smart Scanners! Sharp Results!

HP ScanJet 3200C

Best Value for home

- 600dpi optical, 9600dpi enhanced
- HP PrecisionScan LT OCR software, Adobe PhotoDeluxe 2 included
- 30-bit image processor
- Parallel interface



(74116)

\$188

HP ScanJet 4100C

The easiest scanner for home

- Guided workflow for quick results.
- One-touch scan and copy buttons.
- Easy to set up and fast operation with USB.
- 600dpi Hardware Super Sampling, 1200dpi enhanced.
- USB interface

**USB
INTERFACE**



(67196)

\$269

HP ScanJet 5200C

Highest productivity for business

- 600dpi optical, 9600dpi enhanced
- HP PrecisionScan 2.0 OCR software, Adobe PhotoDeluxe Business edition, Caere PageKeeper Standard, On-line email & Web Task software
- ScanJet copy utility
- USB and Parallel

**USB &
PARALLEL**



(74118)

\$464

HP ScanJet 6250C

Best image quality for professionals

- A powerful networkable scanner
- 1200dpi Hardware Super Sampling, virtually unlimited enhanced resolution
- Integrated automatic document feeder
- USB interface, SCSI capable

**USB
& SCSI Capable**



(66185)

\$940



HP ScanJet 6200C

Network Capable. Includes Slide adapter. USB interface, SCSI capable.

\$760

(66184)

BUNDLES

ScanJet 5200C + OEM ADOBE PHOTOSHOP 5.0

\$916

(75952)

ScanJet 6200C + OEM ADOBE PHOTOSHOP 5.0

\$1,324

(71635)

ScanJet 6250C + OEM ADOBE PHOTOSHOP 5.0

\$1,497

(71636)



ScanJet 6250C + Omnipage Pro 9.0

\$1,210

(70707)

Features of Intelligent Scanning Technology

| | 3200C | 4100C | 5200C | 6250C |
|--|-------|-------|-------|-------|
| Push button scanning | | ✓ | ✓ | ✓ |
| Dual image scanning | ✓ | ✓ | ✓ | ✓ |
| Auto descreen/deskew | ✓ | ✓ | ✓ | ✓ |
| Integrated OCR | ✓ | ✓ | ✓ | ✓ |
| 36-bit colour image processor | | ✓ | ✓ | ✓ |
| Scan direct to application (drag & drop) | | ✓ | ✓ | ✓ |
| Line art enhancement | | | ✓ | ✓ |
| Preview outline by region type | | | ✓ | ✓ |
| Auto page format retention | | | ✓ | ✓ |
| HP PrecisionScan LAN for network sharing | | | | ✓ |
| Intelligent Assistance | | | | ✓ |
| Unlimited enhanced resolution | | | | ✓ |
| Advanced imaging controls | | | | ✓ |
| 35mm slide scanning | | | | ✓ |

**HP
Scanning
Technology
at a glance**

It does the
thinking for
you!





Making images work for you

More from Agfa

Transparency Adapter for SnapScan 1236s. Max. scanning area 203x254mm. (76779)

\$399

Automatic Document Feeder for DuoScan T1200. (75581)

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Softcase for ePhoto 1280. (75606)

\$33

Cable set for ePhoto 1280/780/1680. (75603)

\$46

8MB Memory option for ePhoto 1280. (54719)

\$192

ePhotoAC Adapter & case (75337)

\$118

Have a look at the Harris Technology Web Site www.ht.com.au, not only for Agfa products, but also for the latest pricing and information on 33,000+ other computer products!



SnapScan 1212p

One pass, high quality 600x1200ppi scanner with parallel interface. 36-bit colour. Includes Omnipage LE OCR, Paperport, iPhoto Express, and FotoLook software. Compact design. Great value for money! Compatible with Win95/98/NT.

(74495)

\$249



SnapScan 1212u

New translucent green version. One pass, high quality 600x1200ppi scanner (9600ppi max) with USB interface. Includes Caere Omnipage LE OCR, Caere PageKeeper, Corel PrintHouse Magic Select & Agfa's incredible ScanWise software. Compatible with Win98 & USB Technology.

NEW PRODUCT

(74496)

\$265



SnapScan 1236s

One pass, high quality 600x1200ppi scanner (9600ppi max.) with SCSI-2 interface. 36 bit colour. Includes Omnipage LE OCR, PaperPort, iPhoto Express, Color-It, and FotoLook software. Compatible with Win3.x/Win95/98/NT.

(74497)

\$389



DuoScan T1200

TwinPlate™ flatbed scanner with built in transparency scanning SCSI-2 interface. Maximum resolution 2400ppi. Includes Omnipage LE OCR, PaperPort, Agfa's FotoLook, ColorTune, Caere OCR Software, Corel PhotoPaint 8. Document feeder also available.

(74498)

\$1,315



ePhoto CL50

Digital camera with built-in microphone for adding up to 10 seconds of voice or sound per image. Resolution 1600x1200 pixels. 3x optical, 2x digital zoom. Optical viewfinder and 2" LCD screen. Burst mode: hold shutter for continuous shots. Up to 96 photos on the included 8MB card.

(76793)

\$1,760



ePhoto 1680

Digital camera with swivel zoom lens for those hard-to-get photos. Resolution up to 1600x1200 pixels for photo-quality prints. 3x optical zoom, 2x digital zoom. 2" LCD screen. 5 and 10 second self-timer. Up to 48 photos on the included card. 4 flash settings. Ability to save camera settings.

(72300)

\$1,760



ePhoto 780

Digital camera that doesn't let you wait between shots! Four image quality options. View your pictures on a tv. Resolution up to 1024x768 pixels with Agfa PhotoGenie Technology for outstanding prints without jagged edges. 1.8" LCD screen. Up to 96 photos on the included card. Self-timer. 4 flash settings.

(70188)

\$699



ePhoto 1280

Digital camera with swivel zoom lens that lets you take pictures from any angle. View your pictures on a tv. Five image quality options. Resolution up to 1280x960. 3x optical zoom, 2x digital zoom. 2" LCD screen. 5 and 10 sec. self-timer. Up to 60 photos on the included card. 4 flash settings.

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REX

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Page

39

PC Security & Management

MCAfee Office



(70213)

\$165

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VirusScan 4 - The worlds best virus detection. **Nuts and Bolts 98** - Ultimate Windows repair/optimisation. **First Aid 98** - Fixes Windows problems automatically. **Hurricane 3** - Speed-enhancing tools to boost program launch times. **Uninstaller 5** - Cleans up your hard drive. **Oil Change** - Scans computer for installed software/hardware, lists new updates/drivers available on the Internet. **Guard Dog Deluxe 1** - Stops bad ActiveX / Java Applets. **2000 Toolbox 1** - Complete Year 2000 check and fix.

MCAfee VirusScan



Classic Version (70216)

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Deluxe Version (70215):

\$82

MCAfee First Aid Deluxe 2000



(76042)

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NEW RELEASE

If you've ever had a problem with your PC, you need First Aid!

Examines and Heals Your Computer. As soon as your computer starts up, First Aid begins monitoring for Windows problems. It will examine the entire PC, (including your Internet setup), and solve problems concerning: Crashes, Software Conflicts, e-mail, Web Connection, Hardware Conflicts, Disk Failure, Multimedia, Printer Setup. New features: Universal Undo- make changes to your computer or settings without worrying about mishaps! Pre-schedule a system Checkup or QuickClean session. Year 2000 Fix. Clears Internet junk files and temp files. Virus alert and detection.

MCAfee 2000 Toolbox



(65252)

\$50

2000 Toolbox is more than a millennium product. It's what you need for superior performance TODAY.

Checks Time Clock Hardware and BIOS & fixes problems. Scans data files (incl. Excel, Access and others) for potential date problems. Scans for and fixes 2 year date fields in data files. Checks and optimizes Windows settings for operation beyond 2000.

MCAfee 2000 Toolbox gives you overall PC protection, right now: Virus protection, backs up critical system regions and helps get your system up and running in case of a disaster, monitors your system, alerts you to potential problems etc.

MCAfee PGP Personal Edition



(60523)

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For Personal Privacy.

Easy to use personal encryption software for e-mail and files.

You have every reason to be concerned about the privacy of business and personal data on your PC. Now you can keep this information secure with PGP for Personal Privacy, the most powerful security utility available for e-mail and files. PGP for Personal Privacy uses PGP's strong public/private key technology with at least 128-bit keys, so only intended recipients can decipher the contents. And with our enhanced graphical interface, toolbar and system tray icon, PGP for Personal Privacy is even easier to use.

MCAfee Nuts & Bolts Deluxe 98



(65253)

\$95

NEW RELEASE

Optimises, monitors and analyses system & software to maximise performance.

Features the following packages:

Nuts & Bolts - Utilities package. **VirusScan** - Antivirus package. **WebScanX** - for Internet security. **PGP** - for encryption. **Hurricane** - performance enhancer. **Year 2000 fix** - checks and corrects PC for year 2000 compatibility. **Discover professional** - system information. **Disk Minder** - Finds and fixes serious hard drive errors. **Disk Tune** - Defragments hard drives. **Bomb Shelter** - Provides programme protection using on-chip capabilities. **Registry Wizard** - Cleans.

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Window to the Future. Watch this space for McAfee Office V2.0 and McAfee Uninstaller V5.0

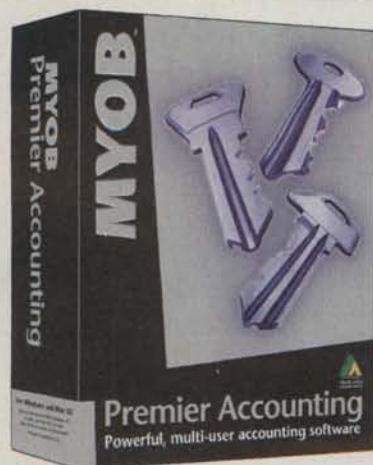
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(46944)

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(58594)

\$474



(58600)

\$324

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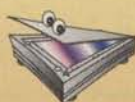
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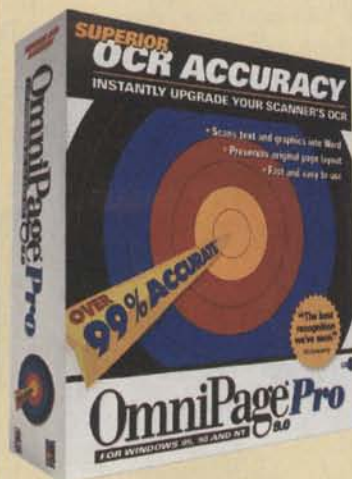
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Page
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Where do you want to go today?

Microsoft Windows 98



Works better,
plays better.

Full Version: (60621)

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Upgrade: (60622)

\$143

The Microsoft Windows 98 operating system is the upgrade to Windows

that makes your computer work better and play better. It works better by making it simple to access the Internet and by providing better system performance along with easier system diagnostics and maintenance. With Windows 98, your system plays better as well with support for the latest graphics, sound, and multimedia technologies, the ability to easily add and remove peripheral devices with support for Universal Serial Bus (USB), and it also enables the convergence of the PC and TV in your home. Windows 98 is also the best platform for Office 2000.

Microsoft FrontPage 98



Easily create great-looking Web sites.

Full Version: (54016)

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Upgrade: (54017)

\$80

Microsoft FrontPage 98 is a quick, effective way to create and manage

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great-looking
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Upgrade: (56130)

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Microsoft Publisher is the world's leading

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Illustration, photo
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to use product.

(69781)

\$250

Microsoft PhotoDraw

uniquely provides photo editing and illustration in one easy to use program to help Microsoft Office and small business users create custom looking graphics to use in PowerPoint, Word, Publisher and the Web. Includes professionally designed templates, pre-set defaults and automatic correction features. With PhotoDraw, users can assemble, manipulate and customize any of the following graphics elements: clip art, shapes, photos, including scanned photos and those downloaded from a digital camera, text, images from other graphics programs and user-drawn illustrations.

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JULY

Page

44

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Microsoft Office 2000 Resource Kit

Delivered direct from the Microsoft product group this powerhouse kit will solve the information needs of anyone charged with planning, rolling out, and maintaining an Office 2000 Enterprise installation. This comprehensive reference focuses on key office 2000

administrative issues and functions, covers all phases of the product life cycle, and provides timely insight into suite enhancements. Provides companion tools and utilities on CD-ROM.

(74212)

\$70

Microsoft Office 2000 8-in-1 Step by Step



So new we don't have a picture Microsoft Office 2000 8-in-1 Step by Step combines excerpts from the

individual Step-by-Step books that cover: Microsoft Excel 2000 • Microsoft Word 2000 • Microsoft Powerpoint 2000 • Ms Access 2000 • Ms Outlook 2000 • Ms Publisher 2000 • Ms FrontPage 2000, and Microsoft Internet Explorer version 5. This title is the easiest and fastest way to learn the core functionality of Office 2000 Components.

(74211)

\$60

The right information means higher productivity sooner. MS Press Office 2000 range provides training and reference solutions for users at all experience levels and with many different learning styles.



Microsoft Press Running Office 2000 Professional

RUNNING MICROSOFT OFFICE 2000 PROFESSIONAL is a reference/tutorial that takes readers through the Professional package: Microsoft Excel, Word, PowerPoint®, Access, Outlook™, and Internet Explorer. The series is designed to be easy-to-use, with a friendly, open design, featuring copious screen shots, call-outs, cross-references, and tips. The new generation Running series is more in-depth than ever before!

(74222)

\$58

Other Office 2000 professional titles

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|------------------------|---------|-------------|
| Running Excel 2000 | (74170) | \$55 |
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| Running Word 2000 | (74175) | \$50 |
| Running FrontPage 2000 | (74172) | \$55 |



Microsoft Press Excel 2000 At a Glance

MICROSOFT EXCEL 2000 AT A GLANCE gives readers a fast, easy, visual way to solve problems and get work done with the latest version of Microsoft's popular spreadsheet program. This reference title delivers concise answers and is an ideal desk-side companion for users who need quick problem-solving information.

(74183)

\$30

Other At a Glance titles

| | | |
|-----------------------------|---------|-------------|
| Word 2000 At a Glance | (74187) | \$28 |
| Access 2000 At a Glance | (74182) | \$25 |
| Office 2000 Pro At a Glance | (74221) | \$27 |
| Publisher At a Glance | (74201) | \$25 |
| Outlook At a Glance | (74185) | \$25 |



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(75949)

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Page

45

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Windows NT Workstation 4.0

Workstations are for people who work.

60% of the IT people deploying Microsoft Windows NT Workstation today are giving it to employees who use standard Windows based applications like Microsoft Excel and Wrok. Not just engineers doing CAD stuff. Normal people doing normal work using normal software.

So why deploy Windows NT Workstation now?

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Because the average PC Shipping today has plenty of power to run it.

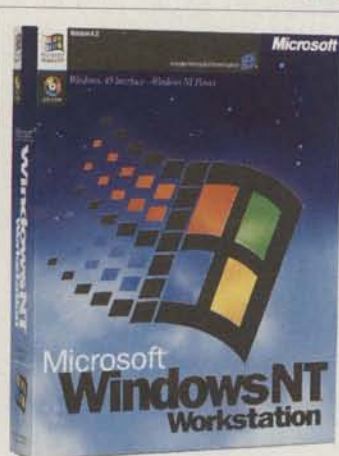
Because it runs 20% faster on todays standard business machines.

Because it is Windows, so it fits into your company's current mix without hassles. And because it is Windows NT, so it delivers more power, reliability and security than your average user has ever known.

In fact, right now, the question is not who needs Windows NT Workstation. The better question is who doesn't.

To evaluate how Windows NT Workstation 4.0 can help your people work, visit the Microsoft Web Site at www.microsoft.com/australia/chooseNTW and order a Business Readiness Kit. While you're there, check out the licensing options which make migration to Windows NT Workstation 4.0 today (and Windows 2000 professional in the future) a very affordable choice. **Let's go to work.**

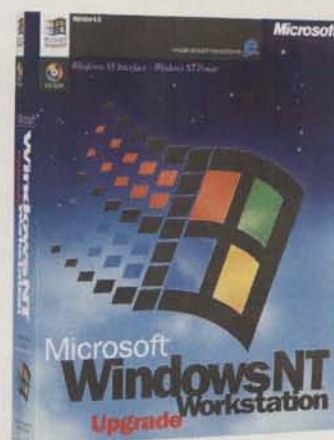
Windows NT Workstation 4.0



**Windows NT
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(27172)

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**Windows NT
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Upgrade**

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\$225

Powerful and secure operating system for Workstations

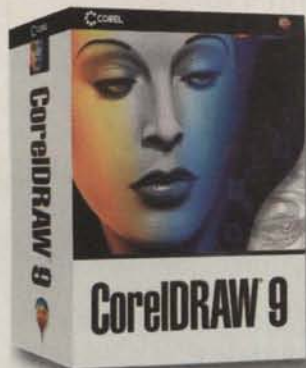
- Win-95 look and feel. Includes Start Menu, Explorer, Wizards
- Support for right mouse button shortcut tasks
- Preemptive multitasks 16- & 32-bit applications for high responsiveness
- Protects critical operating system code, device drivers & data in apps
- Provides integrated security which ensures that critical data is safe
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- Allocates separate memory space for 16-bit apps, so if one fails, it won't bring down the other apps or operating system
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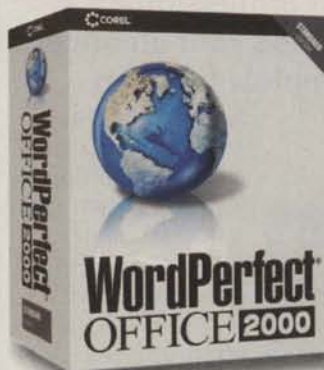
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Upgrade: (76974)

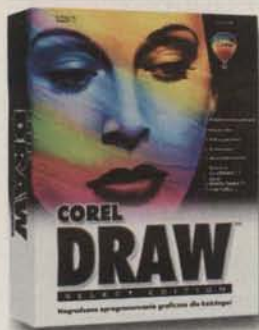
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Discover an office suite that works YOUR way: WordPerfect Office 2000. Ideal for home and business, it offers powerful software for word processing, spreadsheets, and presentations. Share files across most major programs and publish to the Web from the core applications.

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- Trellix® 2.0: Web publisher

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(75317)

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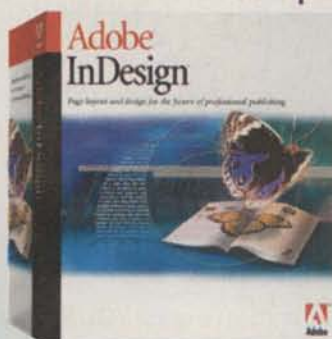
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(41188)

NEW PRODUCT

Adobe InDesign

The future of professional publishing. Express your creative ideas with complete freedom.



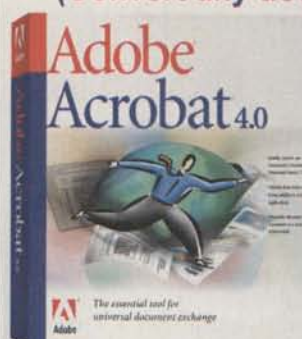
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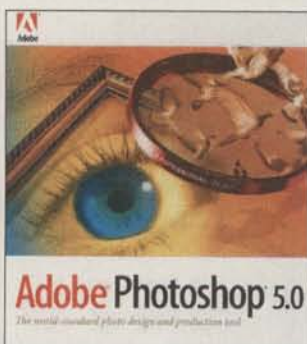


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(60164)

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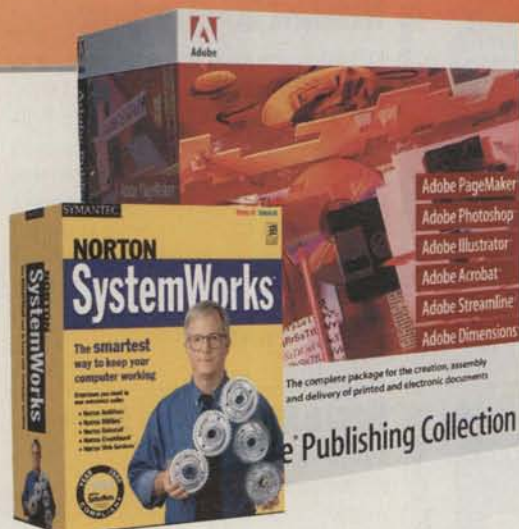
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(72410)

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(62570)

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(70659)



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(54480)

\$498

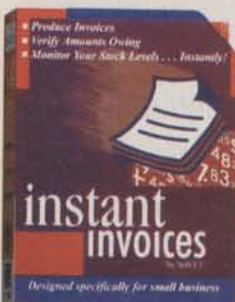
FreeHand



FreeHand 8.0 has the power you need to develop everything from simple illustrations to complex designs with a minimum of effort! FreeHand is the fastest way to go from design to finished product.

(32845)

\$785



\$62

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(77861)

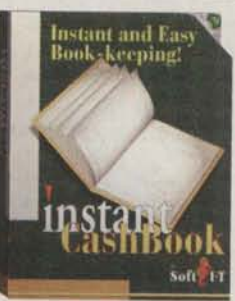


\$179

Instant Accounting

Instant Accounting solves the problem of integrated accounting packages for small business owners who don't need a high-powered, complicated package and don't want any hard-to-learn software slowing down their operations. With this program, small business owners can gain all the important aspects of accounting in one simple-to-use product. If your business is big enough now to need a proper accounting system, that will definitely save you money at tax time!

(77858)



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(77860)



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(77863)



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(69169)

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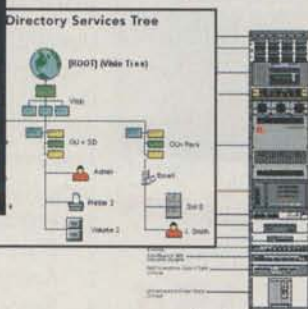
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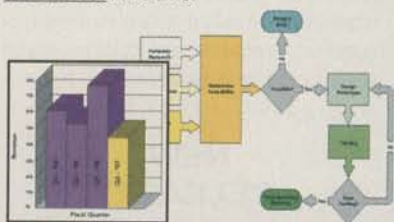
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Create smart business diagrams quickly

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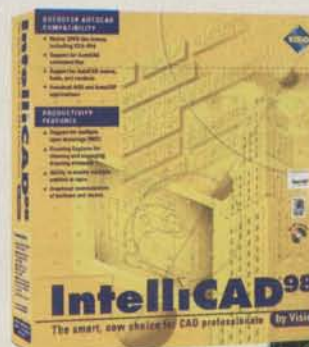
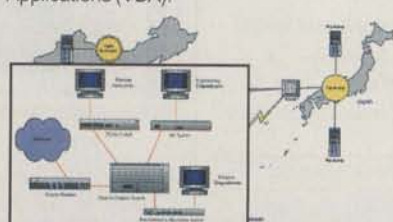
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(58627)

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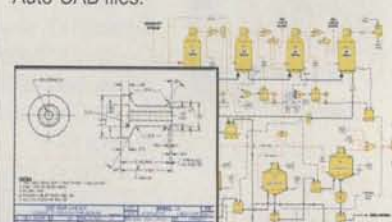
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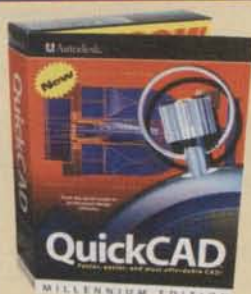


(76829)

\$759

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(76826)

\$75

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(06701)

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(69114)

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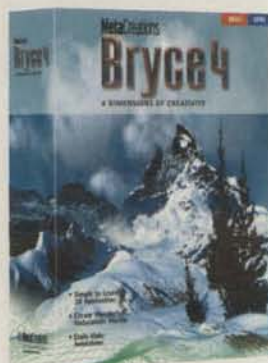
(51065)

\$585

Painter
5.5

(70060)

\$540



(75941)

\$489

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(72519)

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(77613)

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(75888)

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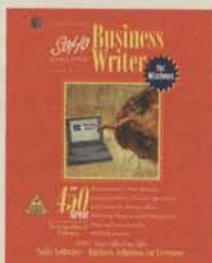
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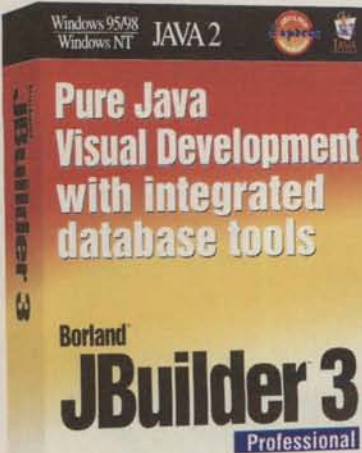
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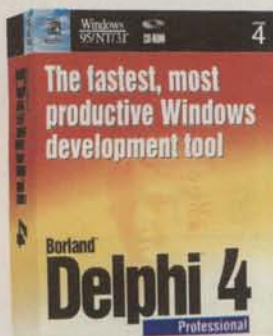
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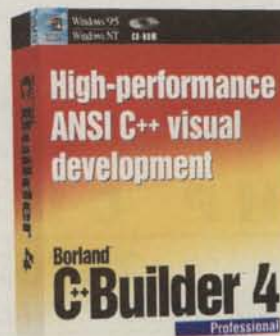
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Page

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Large Vocabulary

All of the words most people use everyday are immediately recognized. The 30,000 word active vocabulary contains words and names that cover a wide range of subjects. Less common words can be quickly retrieved from the 200,000+ word back-up dictionary. New words can be added simply by saying them and spelling them once or by using the Vocabulary Builder tool.

System Requirements

Minimum 133MHz Pentium Processor IBM Compatible PC with 32MB RAM (Faster with MMX)

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Hints for helpdesk practitioners, a guide for QuickBooks users, and more . . .

Quick, get me a doctor!

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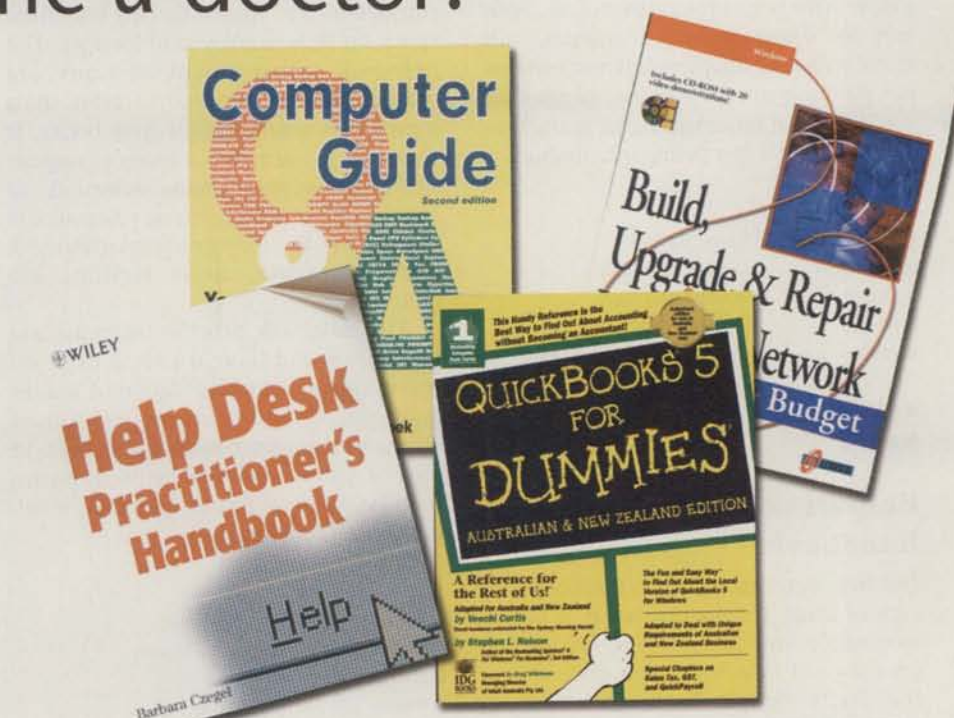
The main problem with this book is that its content doesn't match its title. It does explain how to set up a simple peer-to-peer Windows 95/98 network, but that's as far as it goes. Linux, Unix and NetWare are merely noted because they're not covered, and Windows NT is mentioned only as "the most logical upgrade path". The idea of working to a "shoestring budget" suggests that Linux should have been given more attention, as it is being used by small businesses to deliver adequate server performance from hardware that is far from cutting-edge.

The high level of detail on installing network interface cards suggests this book is aimed at the lower end of its professed "beginner to intermediate" level. There's also a lot of material (over 100 pages) about general troubleshooting and hardware upgrades that would be more suited to a general 'fix and upgrade your own PC' book. Take out the very general coverage of viruses and backup, another 50 pages of US vendor listings, and nearly half of the book would be gone.

The planning chapter provides step-by-step instructions to determine the disk and memory size of individual computers, but next to nothing about permissible cable lengths or other network topology issues, despite the intended home and small office audience. When it comes to shopping for components, most of the advice can be easily translated to the Australian experience.

Although the author discusses scanners, he does not explain how to share them on a network. Modem servers and devices for shared Internet access (such as WebRamp) are briefly mentioned.

The book's design is pedestrian and the reproduction of photographs and screenshots is very ordinary, although the glossary and index are good. The CD-ROM with videos showing how to perform



installation and upgrade tasks (plus some diagnostic utilities) deserves credit, but its image quality could be improved.

Stephen Withers

| | |
|---------------|----------------|
| ■ Author | Wayne Kawamoto |
| ■ Publisher | Coriolis |
| ■ Distributor | Woodslane |
| ■ Phone | (02) 9970 5111 |
| ■ Price | \$49.95 |
| ■ ISBN | 1-57610-411-7 |
| ■ Rating | ☆☆ |

Computer Guide

George Skarbek's *Computer Guide* is a collation of a number of computer-related Q&A columns written for a range of Australian newspapers over the past five or so years, and this is its second release. It's aimed primarily at first-time users seeking a quick fix to common problems and, as such, it reasonably fulfills its aims. If your problem matches

the ones described, you'll quickly find a solution.

However, *Computer Guide* is of limited if you have problems that don't appear exactly as described or you don't know how to describe a problem accurately. The use of generalised answers and hint boxes partly compensates for this, but it is still a fairly big flaw.

Nothing dates faster than computer books and this is a classic example of the problem — while undoubtedly there's still a market for Windows 3.1 questions out there, devoting a large chunk of the book

Guide to ratings

| | |
|-------|------------------------------------|
| ★ | Buffy: For suckers only |
| ★★ | Ally: Definitely on the thin side |
| ★★★ | Veronica: Coming out of the closet |
| ★★★★ | Susan: Suddenly super |
| ★★★★★ | Nikita: La crème de la crème |

to it was perhaps a mistake. Windows 98 gets a brief look in; and Macs are also mentioned, but do five pages out of 293 constitute support?

The book is available on floppy disk and as a downloadable Word file from Skarbek's Internet site (<http://www.skarbek.com.au/>) for the knockdown price of \$7.95. The disadvantage to this approach is that it's really, really obvious that the whole book has been laid out in Word—presentation is simple to the point of being prehistoric, with very few diagrams and a uniform, dull visual style. The floppy or Internet versions are probably the best value, given that you'll search it for answers a lot more than you'll read it for computing information.

Alex Kidman

| | |
|---------------|--|
| ■ Author | George Skarbek |
| ■ Publisher | Skarbek Consulting |
| ■ Distributor | Skarbek Consulting |
| ■ Phone | (03) 9561 9832 |
| ■ Price | \$29.95, downloadable /floppy version \$7.95 |
| ■ ISBN | 0-646-35935-5 |
| ■ Rating | ★★☆ |

Help Desk Practitioner's Handbook

The *Help Desk Practitioner's Handbook* is a curious beast. On the one hand, it has a reasonable amount of useful advice for ground-level helpdesk employees, along the fairly simple lines of effective communication, team attitudes, and so on. On the other hand, it's almost schizophrenic—jumping from the art of any helpdesk practitioner's trade to serious management issues. It's almost as if the author, Barbara Czegel, couldn't decide whether she was writing a handbook for helpdesk practitioners or for helpdesk managers.

One of the book's saving graces is its frequent use of example scenarios to illustrate a point. These tend to end in solutions rather than brick walls, which is a little unrealistic, but they do demystify the author's terminology a little. At times, it's almost as if extra jargon has been forced into the text, which becomes irritating.

The use of very simple diagrams is also annoying—a half-page diagram that consists of one line with two comment spots on it is simply bad design. The helpdesk management sections are reasonable, but don't cover more than most other management-style books. If you need to learn about levels of responsibility, developing mission statements, or creating proactive strategies, you could do worse. For the bottom-level helpdesk grunt, however, these sections are pointless.

The helpdesk practice sections are acceptable and have a strong focus on communications skills. Again, a decent book on communications techniques can cover this sort of material, so delve in only if you're obsessed with scenarios such as Wanda fixing Eugene's word-processing problems.

Alex Kidman

| | |
|---------------|-------------------|
| ■ Author | Barbara Czegel |
| ■ Publisher | John Wiley & Sons |
| ■ Distributor | Jacaranda Wiley |
| ■ Phone | (02) 9805 1100 |
| ■ Price | \$85.00 |
| ■ ISBN | 0-471-31992-9 |
| ■ Rating | ★★☆ |

QuickBooks 5 for Dummies

If you run a company that requires a business finance package like QuickBooks, then it's fair to assume you have a

reasonable grasp of modern accounting processes. It is also probable that you have a computer on the premises.

So why anyone would buy a program like QuickBooks if they need to read a book like *QuickBooks 5 for Dummies* is an utter mystery. It's almost like buying an instruction manual on how to read. Aside from the obvious contradiction in the title, the book itself follows the usual Dummies recipe of splitting the subject into easily assimilable areas, with titles such as 'Cash is King', 'Lots of Lists' and 'Inventory Magic'.

Despite the humorous chapter headings, you can't escape the fact that accounting is fairly dry. Admittedly there are quite a few useful and relevant screenshots, and each section is divided into digestible chunks. But QuickBooks' own setup and online video help is good enough to make most of this book irrelevant or merely a duplication of what is explained more effectively, and interactively, onscreen in the program itself.

There are some extras which don't come as standard with QuickBooks such as the Ten Secret Business Formulas (they like capital letters in Dummies books, don't they?) or Tips for Handling Ten Tricky Situations which are presented as sage advice from the voice of experience, but are really what you can find on most motivational tapes. Dummy? You are if you buy this book.

Jeremy Torr

| | |
|---------------|----------------------------------|
| ■ Author | Veechi Curtis and Stephen Nelson |
| ■ Publisher | IDG Books |
| ■ Distributor | Woodslane |
| ■ Phone | (02) 9970 5111 |
| ■ Price | \$29.95 |
| ■ ISBN | 1-875889-13-2 |
| ■ Rating | ★ |

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Perspective: Travelling at thought speed

Business @ the Speed of Thought: Using a Digital Nervous System

Business @ the Speed of Thought has one central focus: how to make the most of a corporation's digital nervous system. It is not a technical book; it is aimed at business leaders who want to understand how to implement digital processes and solutions to solve business problems and improve operations. The more technically inclined can visit the book's companion Web site (<http://www.speed-of-thought.com/>) for further background information.

Gates covers three corporate functions: commerce, knowledge management and business operations. He draws extensively on case studies from within Microsoft, and from myriad other large corporations including Boeing, Ford, Nabisco, Coca-Cola and Johnson & Johnson. This approach provides a credible, refreshing perspective to the underlying theory.

The book includes anecdotes on Microsoft's own internal shortcomings — no doubt a tactical move by Gates, who seems to be appealing to CEOs and CIOs by demonstrating that not even his own company gets it right all the time. For example, Gates acknowledges that the Internet was the "biggest unplanned event we've ever had to respond to". He shares an amusing story of how Microsoft's internetworking specialist J Allard set up an Internet site which consisted of three machines sitting on a makeshift folding table in a hallway. Power strips and extension cords ran from Allard's office out into the hallway, all held together by duct tape. According to Gates, it wasn't long before a fire marshal saw the setup as a fire hazard and threatened to close down Microsoft's site.

Business @ The Speed of Thought does offer some unique insights into succeeding in the digital economy, but many of the concepts Gates presents were predicted or espoused by others such as Peter Drucker, Shoshana Zuboff, Michael Hammer and Thomas Davenport up to a decade ago.

Useful summary boxes are included at the end of each chapter, reflecting on the business lessons covered and offering a check list for readers to diagnose the digital nervous system of their own organisations. Sideboxes scattered throughout the book offer a slight reprieve; however the small

point size used for the text is quite a strain on the eye.

According to the Australian distributor, Gates is donating his share of the book's profits to international charities that support children's causes — potentially a considerable sum given that *Business @ the Speed of Thought* is being published in 24 languages and will be sold in about 60 countries.

With a price tag of \$39.95, this 470-page book is a worthwhile addition to your library. It is easy to read and offers lots of sound advice on how business leaders can get more from their technology investments.

Cathie Kennedy

| | |
|---------------|----------------|
| ■ Author | Bill Gates |
| ■ Publisher | Viking |
| ■ Distributor | Penguin Books |
| ■ Phone | (03) 9871 2400 |
| ■ Price | \$39.95 |
| ■ ISBN | 0-670-88664-5 |
| ■ Rating | ★★★ |

Cyberscene: A Teen Traveller's Guide to the Web

This book may look like your average guide to the Internet for kids, but it's more subversive. In an era when the Internet is blamed for high school violence and laughable legislation is introduced to protect children online, *Cyberscene* has an important message: online kids are alright.

The author, Nick Moraitis, is a 16-year-old Australian high school student who founded the Teenage Computer Network, an organisation for young people who are interested in computers and multimedia, in 1995. He was also a Web design judge for the LOUD youth media festival. Moraitis believes the Net helps give young people a voice.

The book covers all the categories that teenagers are interested in: education, entertainment, weirdness, Netiquette, games and creating Web sites. The difference with this book is that almost all of the sites referred to by Moraitis are sites produced for teenagers by other teenagers,

not well-meaning adults. In the education chapter, for instance, Moraitis interviews Bennett Haselton, founder of the teen anticensorship group, Peacefire, whose members have an average age of 16. Peacefire questions the way adults make decisions about

children's Internet access by installing filtering software on school and library computers. Moraitis, however, adds that "sometimes [there are] some very good reasons why adults are asking for more censorship of the Internet".

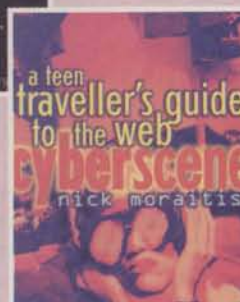
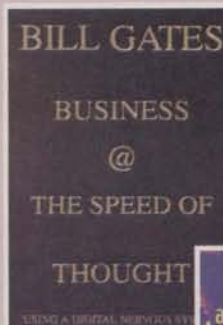
The chapter on education also has some tips on finding reliable information online. It provides the addresses of some useful sites for homework, including the Federal Government's home page, CSIRO, the Australian Bureau of Statistics and NASA. It also suggests students email the experts for up-to-date information.

In the chapter on Netiquette, the book looks at gender issues online, but avoids the obvious references, such as the "cyberfeminist hyperzine" Geekgirl. Instead, Moraitis visits GIRL (Girls Internationally WRiting Letters), a girls-only site that is hosted by the World Kids Network. Moraitis wonders whether GIRL's exclusion of boys is discriminatory, but agrees that a safe space on the Internet is a good idea. Unlike a commercial imitation of the site, Girl Tech, Moraitis says GIRL is successful because it is "built and maintained by the girls themselves".

Although its chattiness and zine-style design may annoy readers, *Cyberscene* is an excellent guide for teen newbies. Its message is that despite the hype, teenagers are responsible enough to make their own decisions about Net use, and are capable of producing some pretty impressive Web sites too.

Glenn Phillips

| | |
|---------------|-------------------|
| ■ Author | Nick Moraitis |
| ■ Publisher | Penguin Australia |
| ■ Distributor | Penguin Australia |
| ■ Phone | (03) 9879 6187 |
| ■ Price | \$24.95 |
| ■ ISBN | 0-14-130209-7 |
| ■ Rating | ★★★★ |



You can design a home page, a garden or a school presentation with the software in this month's Interactive.

Design for living

LandDesigner 3D

Garden design packages have always been a bit tacky: Lego-like trees, cardboard cut-out houses, and monochromatic floral displays, together with confusing Latin plant names. Frankly, all are fairly useless for gardeners without vision or knowledge.

Luckily for those with yellow or brown fingers, the tide seems to have turned. LandDesigner 3D (Version 5) from Sierra is a startlingly useful package that will help anybody plan and maximise their horticultural enjoyment — guaranteed. It even caters for those who, in the initial interview, tick the box 'gardening is just a chore'. That's my kind of program!

The package starts out by determining your climate, soil, drainage, block size and free space in order to define the working canvas. Admittedly, the major area types are all US-based, but you can still approximate local conditions by specifying temperature and climate variations.

Once you have the basics in place, you can then lay out the house, perimeter, easements, orientation (although you'll need to reverse that for Australian conditions) and even lumps and bumps in the garden's surface. The wizards and design guides offer a plethora of ideas for you to consider if you don't know what kind of fence, border plants or trees will suit your situation best.

When you have experimented with plants, beds and even a sprinkler system or two in the standard top view pages, you can tell the program to swap to 3D viewing. This is where the program progresses from good to truly impressive.

The 3D views are as excellent as any yet seen; perspective layering and even limited shadowing contribute to a brilliant rendition of your proposed layout. Even better, you can export it in PDF format so it can be sent to almost anyone to

print out. Add to this full-plan drawing capability, buying list printouts, and customisable templates — not to mention a dazzlingly comprehensive plant database — and this program is brilliant value for any gardener who wants to carry on work even when it's raining.

Jeremy Torr

| | |
|---------------|---|
| ■ Publisher | Sierra |
| ■ Distributor | Dataflow |
| ■ Phone | (02) 9417 9700 |
| ■ Price | \$69.95 |
| ■ Requires | Pentium 90, Windows 95, 16M RAM, 14M hard disk space, 2x CD-ROM drive, SVGA |
| ■ Rating | ★★★★★ |

MP Express

MP Express is a simplified multimedia tool that allows children aged eight years' old and above to create their own presentations.

The software is easy to install and the 'getting started' video introduction and straightforward instruction booklet make it child's play to get impressive results. At a

basic level, students add their own research information to the four types of page template provided. They have reasonable control over fonts, colours and layout to make their reports individual in style.

Two themed resource CD-ROMs are currently available, and more are

promised. Unfortunately, they are a little expensive compared with other clip media collections, especially considering the restrictive licence conditions. These CDs can be used to browse and import appropriate pictures, backgrounds, videos, sounds and music to create a very professional result. Pictures and movies can easily be repositioned and resized. As the most common graphic, movie and sound formats (with the exception of MIDI) are supported, you can use resources that you have created or obtained from other collections. The sound



studio feature is useful for mixing sounds and voice-overs.

After children have done their research, the information can easily be typed in (unfortunately there is no spell checker) or recorded as a narration.

Although a presentation can be exported with or without an embedded player for easy transfer to another computer, the resulting files will almost certainly be far too big to transport on floppies. This makes it awkward for a student to do a project at home and then take it to school.

MP Express is easy to use and ideal for group work in the classroom. Using it means more time will be spent on learning and researching the topic, rather than on the presentation medium. It is also great fun and produces very satisfying results.

Catherine Howard

| | |
|---------------|--|
| ■ Publisher | Bytes of Learning |
| ■ Distributor | Dataflow |
| ■ Phone | (02) 9417 9700 |
| ■ Price | \$69.95 (resource CD-ROMs, \$49.95 each) |
| ■ Requires | 486, Windows 3.1, 8M RAM, CD-ROM drive, 16-bit Sound Blaster or compatible; 68040, System 7, 12M RAM, CD-ROM drive |
| ■ Rating | ★★★★ |

SnapShot

Although digital cameras are the flavour of the decade, the success rate for pictures is no higher than with conventional film shooters. Luckily, digital images lend themselves to tinkering to get rid of lamp-posts, red-eye glare and bad exposures.

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Interactive News

● It took a while for record companies and those with a vested interest to catch on to the significance and prevalence of MP3 music files, but the realisation is now kicking in with a vengeance. As a result, everyone wants a piece of the pie and there are a host of new formats for digital and downloadable music. The MP3 format is hated by many in the music industry because of its relatively small file size and the ease with which copyrighted music can be pirated. Although MP3s have only been around for a short time, technology is already beginning to make the format outdated. A raft of competitors are about to release, or have just released, their versions of digital music files and players,

including Seagrams Universal Music Group, Liquid Audio, AT&T Labs' a2b Music, Sony, Microsoft, IBM, along with others. Get your wallets ready, consumers — it's time to start paying . . .

● Though no-one actually knows how the Internet is going to evolve, it seems a safe bet to assume that there will be more convergence between traditional media (TV, radio and so on) and the Net. At least, many of the large Internet corporations see this as a distinct possibility — take AOL, for example. We're still talking rumours, but it seems AOL may be about to invest about \$US250 million in radio broadcaster Chancellor Media. This comes on the heels of AOL's recent investments in phone companies such as Bell Atlantic and SBC

Communications, and its plans to move into Web TV with the as yet unreleased AOL TV set-top boxes.

● More portal news — Australians finally have access a local version of the Yahoo customisable home page. Yahoo, one of the earliest adopters of the customised portal home site with <http://my.yahoo.com/>, is the first company to launch a significant home page Australian portal. It includes localised news, weather, stock prices, TV listings, and more. The concept of a personalised site is great, but the lack of localised content has been a drawback for Australian and other non-US users up until now. Check out <http://au.yahoo.com/> for more.

Gareth Jones

Most digital cameras, however, come with fairly intimidating software that is up around the Photoshop level and fairly unsuited to point-and-snap photographers. Sierra has introduced a new package called SnapShot which is aimed at novices who want to take pictures, not learn layering technique or tonal histogram adjusting. SnapShot allows the user to deal with TWAIN images, either scanned or direct from cameras, plus file images, all through a series of idiot-proof menus and a big work area.

The options range through Get, Organise, Edit, Projects and Output. Each drills down into a specific action menu displayed on the left-hand side of the work area; it's utterly devoid of complex descriptions. Instead, simple and understandable icons are used for all the possible functions.

These are quite sophisticated, however, and dipping into the Advanced option reveals a comprehensive swag of special effects as well as the usual crop, straighten and fix options. The only issue this raises is the limitations of the Undo function. This only allows one level of backtracking — rather poor, given the complexity of some functions.

Album and project organisation are both well presented, with the usual rag-bag of certificates, cards, sticker tem-

plates and so on. Output can be directed to either standard file or print, but also to self-extracting email postcards or Web pages — very useful.

Overall, SnapShot is both easier to use and more comprehensive in scope than comparable Adobe or Microsoft software.

Jeremy Torr

| | |
|---------------|--|
| ■ Publisher | Sierra |
| ■ Distributor | Dataflow |
| ■ Phone | (02) 9417 9700 |
| ■ Price | \$69.95 |
| ■ Requires | Pentium 90, Windows 95, 16M RAM, 85M hard disk space, 2x CD-ROM drive, SVGA |
| ■ Rating | ★★★★ |

Ixla Web Easy

Ixla Web Easy doesn't pretend to offer a complicated Web design package for HTML professionals. It targets the home user, who probably has a 5M home page allocation as part of their ISP package, but has no idea whatsoever about tags, tables and framesets, and doesn't want to know.

Web Easy's design paradigm is pure WYSIWYG — rather than dealing with pages of code, users simply select objects, such as text items or images and dump them on a page, desktop publishing style. Web Easy does the rest,

converting the result into reasonably clean code. There is a little too much dependency on setting up each and every page as a huge table, whether or not the page really needs it, but this wouldn't even be a consideration for those not interested in code.

To help out those lacking in inspiration, Web Easy comes with a selection of Web page templates on which to build — although you'd be wise to avoid some of the more garish 'business' templates. If you simply want to set up pictures of your family pets, the interface is easy to use and fairly self-explanatory. It also includes 50,000 Web images.

However, it has a few drawbacks, even for home users. The object oriented interface doesn't allow you to easily create tables. You have to specifically align each object in relation to both its row and column neighbours, which is time consuming. Given Web Easy's preoccupation with producing pages that are massive code tables, why is there no table creation facility? Web Easy also uses its own file format (WEB), and won't even look at HTML pages, which means it's more or less useless if you have existing pages.

Web Easy is fine if you are new to Web design, but you'll soon outgrow it.

Alex Kidman

| | |
|---------------|--|
| ■ Publisher | Ixla |
| ■ Distributor | 123 EasySoft |
| ■ Phone | 1300 303 553 |
| ■ Price | \$89.95 |
| ■ Requires | 486/33, Windows 95, 16M RAM, CD-ROM drive |
| ■ Rating | ★★ |



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| Cat. 6384 | Ext Case 2 x 3.5/5.25" SCSI | \$239 |
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| Cat. 15064 | RGB to SVGA Converter | \$194 |

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| Cat. 8095 | 32 Key Numeric Keypad | \$147 |
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Also available are a 26 key calculator keypad with LCD display and an 18 key keypad keyboard wedge model.

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| Cat. 8486 | Calculator - keypad | \$155 |
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Cat. 3102 VGA to Video Converter \$499

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built into a standard size power supply and the batteries & front panel occupy a 5.25in drive bay. The UPS is rated at 500VA. Apart from power failure, the UPS also protects against over voltage, under voltage, overload & DC short circuit. Optional software provides for automatic shutdown.

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| Cat. 2314 | Bi-directional 1 Port | \$45 |
| Cat. 2315 | Bi-directional 2 Port | \$61 |
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| Cat. 2235 | ECP/EPP 1 Port | \$79 |
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|-----------|----------------------------|-------|
| Cat. 2618 | 1 Port Printer PnP PCI | \$159 |
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| | | |
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| Cat. 8419 | Smart Pad Digitizer 12" x 12" | \$349 |
| Cat. 8185 | Smart Pad Digitizer 18" x 12" | \$825 |

Year 2000 BIOS Card



This card carries the NSTL "Compatibility Test" seal.

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| | | |
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| Cat. 3359 | Year 2000 BIOS Card | \$129 |
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Lore and order

Civilization: Call to Power

If you've never played Civilization before, there is no doubt you'll have fun with the latest rejig — at least initially. All the elements that made Civilization (regarded by many as the greatest game ever) and Civilization II so addictive are here — the varied units, the Wonders of the World, the diplomacy and trade.

You can pursue an enlightened path to victory through scientific advancement or satisfy your bloodlust and conquer by sword. The graphics have been improved as well, and while eye candy is not central to a game of this kind, it is nice that your empire looks so good.

However, if you're a seasoned player of the earlier games, the picture soon unravels. Activision has assumed that



the best way to improve upon Civilization II is to add more of everything. And while this abundance is exciting, it is soon apparent that game balance has been sacrificed.

The biggest culprits are the new, unconventional units. Take for example the biological terrorists. A single attack releases a virus that can destroy every improvement in a city and infect all its trading partners. This restricts your options considerably because you are forced into specific strategies to defend against such monstrous power.

In Call to Power (unlike Civilization I and II) you are more like the manager of an empire than of a constellation of city-states. And while this is a welcome change, the interface can make life difficult. It is somewhat clumsy, the layout is



not intuitive, and a few bugs are still scuttling about (for example, build queues sometimes get stuck so that cities keep churning out the same unit). If a patch were made to fix these things and redress the balance issues, then Civilization: Call to Power would be warmly recommended.

Jon Gill

| | |
|------------------|---|
| ■ Distributor | Directsoft |
| ■ Phone | (02) 9482 3455 |
| ■ Online | http://www4.activision.com/games/civilization/ |
| ■ Price | \$89.95 |
| ■ Requires | Pentium 133, Windows 95, 32M RAM, 4x CD-ROM drive, 16-bit high colour video card |
| ■ Classification | G |
| ■ Rating | ★★☆ |

Lands of Lore III

If it weren't for some hideous flaws, Lands of Lore III (LOL3) would be quite an enjoyable game. Unfortunately, most players will be so frustrated by the inadequacies of the game that they'll give up early.

For a start, the level load times are unbearable; it takes several minutes for every new map to load. You also have to constantly switch between the four CDs. You need an awful lot of hard disk space and memory: with installation and swap file needs, expect LOL3 to suck up about 1G of hard disk space. Finally, there's the frequent crashes and lock-ups, which not only require you to reboot your system, but further punish you by forcing a lengthy 'cache rebuild' when LOL is

restarted. Applying the downloadable patch does not help much.

If you can get past all that (repeat to yourself: "I used to wait 20 minutes for Mission Impossible to load on the C64"), the game is not half bad. The controls are intuitive, the first person 3D graphics are good for an RPG and the overall game design has a lot going for it. At times it does degenerate into excruciating dungeon wandering, but it is rewarding overall.

You play Copper, a half-breed and heir to the kingdom of Gladstone. Unfortunately, some nasty demon-dogs just killed your family and stole your soul. Time to get it back and save the kingdom. Your journey will take you through five different worlds, starting at Gladstone, where you learn the skills of the warrior, mage, thief or healer (or all of the above) by joining guilds.

The skills you can learn are quite cool, and the addition of familiars to perform tasks for you is nice. The attribute and advancement system is extremely simple.



If you really liked Lands of Lore II, then you'll probably enjoy LOL3. I doubt the latest instalment will earn the series any new converts, however.

Nathan Taylor

| | |
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| ■ Distributor | Electronic Arts |
| ■ Phone | (02) 9955 7744 |
| ■ Online | http://www.westwood.com/ |
| ■ Price | \$89.95 |
| ■ Requires | Pentium 166, 32M RAM, 4x CD-ROM drive, 2M video card (3D video card preferable), DirectX 6 |
| ■ Classification | MA 15+ |
| ■ Rating | ★★☆ |



Resident Evil 2

Bad things are happening in Raccoon City. Very bad things, in fact, and it's up to you to shoot the evildoers in the head several times until they fall over, or you do.

Resident Evil can best be summed up as an 'interactive movie', a term applied to many lacklustre games in the past. Thankfully, Resident Evil is anything but — provided you're into B-grade horror movies. Not objecting to the odd splash of gore would be a plus, too.

You take control of either Leon or Claire as they wander into the now zombie-infested Raccoon City and attempt to survive. Capcom describes the game as "survival horror", which is pretty spot on. Brief and bloody combat sequences are interspersed with puzzle solving and plot revelations. To keep the movie suspense going, the music is normally fairly sedate, right up until the point that something tries to kill you.

Resident Evil 2 plays well and looks good. All the areas in the game are pre-rendered and viewed from a fixed camera angle as you follow your chosen character around. Control is kept as simple as possible. You can aim, shoot, run or examine objects. The button for examining is also used for opening doors and climbing objects, so you're unlikely to die if you forget where the keys are.

Resident Evil 2 is gory. Very gory. The cover advisory sticker states "medium-level animated violence", and if this is medium-level, high-level probably involves spontaneously exploding infants.



Games News

● It's E3 time again, and this year's show was bigger and better than ever. But not for everyone. It was actually two years ago at E3 1997 that 3D Realms' *Prey* was first showcased, amid much anticipation and positive press. The game was slated for release in the near future, and the game-playing world was very excited. And then the E3 1998 show featured *Prey*... again. And now we find ourselves in mid-1999, still without *Prey* on the shelves or in our hands. But was it shown at this year's E3? Well, in a word, no. 3D Realms didn't attend the show at all. So no imminent release dates for *Prey* — or Duke Nukem Forever, another high-profile 3D Realms game which has been in development for three years or so.

● *Jagged Alliance 2* finally has a publisher. Its developer, Sirtech, was formerly comprised of two divisions: one for development and one for games publishing. With the growth of megapublishing houses, Sirtech Publishing fell by the wayside and was disbanded late last year, leaving the newly

completed *Jagged Alliance 2* in limbo. TalonSoft, a division of Take-Two Interactive, has stepped into the breach and agreed to publish the game in the US, UK, China and Australia.

● Despite the recent moral panic concerning high school shootings in the US and specious causal links between computer games and real violence, the US Postal Service will be launching a stamp to commemorate the impact of video games upon society — in the '80s! Though it wasn't until the '90s that video and computer games really began to gain the huge popularity they enjoy today, consumers in the US chose the growth of video games as the most memorable reflection of the '80s. It's a strange world (in the US), isn't it? Arbitrage, naked greed, cocaine, futures trading, Reaganomics, pastel as high fashion, Adam Ant, terrible B-grade movies — denigrate my geek tag if you like, but things like this are getting my vote for stuff that happened in the '80s, not video games.

Gamespy

Combat isn't everything in this game though. David traverses forests, cities, oceans and caves and you'll frequently stop to admire the rich, beautiful surroundings. Surprisingly however, this game does not require a 3D-accelerator.

The initial 'boy saves girl' adventure tale seems hollow, but the plot does eventually deepen. Silver's evil plans are uncovered, and you learn about eight long-lost magical orbs which, if found, will give David the power he needs to eventually face Silver.

Unfortunately, the behaviour of David's companions is often bewildering as they frequently stand by uselessly in heated battles.

As a seasoned PC gamer, I found the restrictive, console-style save game feature infuriating. Not being able to save your game at any time becomes so annoying that it will often leave you contemplating whether it's worth continuing your quest. The lack of a decent pause is equally irritating.

Despite these annoyances, it is a great adventure and there is much enjoyment to be had. This game is thoroughly recommended for anyone seeking an adventure game, spiced with combat, magic and mystery.

Alan Crawford

Those of a nervous disposition, or looking for an ideal present for a child, had better give Resident Evil a miss. Horror buffs and gripping action-adventure fans should go out and buy it.

Alex Kidman

| | |
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| ■ Distributor | Sega Ozisoft |
| ■ Phone | (02) 9317 0000 |
| ■ Online | http://www.vie.co.uk/ |
| ■ Price | \$89.95 |
| ■ Requires | Pentium 166, 32M RAM, 4x CD-ROM drive, 4M video card, DirectX 6 |
| ■ Classification | MA 15+ |
| ■ Rating | ★★★★ |

Silver

"Revenge!" swears David, as the evil Silver abducts his wife. But as the first hordes of Silver's army approach, the illustrious warrior you play in Silver soon realises vengeance doesn't come easily.

The first few encounters are challenging, especially as the classic point-and-click style combat method isn't good enough. In this world, various mouse movements and keystrokes are used to control the sword. Pushing the mouse forward while holding Ctrl causes a destructive lunge, which can swiftly disembowel your nearest opponent.



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| ■ Distributor | OziSoft |
| ■ Phone | (02) 9317 0000 |
| ■ Online | http://www.infogrames.net/silver/ |
| ■ Price | \$89.95 |
| ■ Requires | Pentium 166, 32M RAM, 8x CD-ROM drive, 2M VESA video card |
| ■ Classification | G15+ |
| ■ Rating | ★★★★ |

Starsiege

MechWarrior 2 has been a permanent installation on my last three PCs, so I was keen to give this new mech game a whirl. At the top of my current playlist is Starsiege Tribes, a spin-off title which was actually released before its parent.

Both Starsiege and Starsiege Tribes use the same smooth, outdoor game engine, but Tribes is multiplayer-only and involves footsoldiers, whereas Starsiege is primarily a single-player exercise in piloting huge robots into battle. There's a complex plot which is enhanced with movies and a beautifully printed novella, and the action is mission-based. Most missions are introduced by the drawling voice of Mark Hamill (aka Luke Skywalker or Colonel Blair), playing your rough-and-ready unit commander.

Unfortunately, after a limp training exercise, the first few missions leave much to be desired — simple, linear 'walk to the enemy and fight' tasks that detract from the game's atmosphere. But

as the epic unfolds and missions become more intense, Starsiege reveals its depth. After a while it feels like a good Wing Commander game, where you look forward to the next instalment.

But there are serious problems with its control methods — whoever designed these mechs should be stomped on. The cockpits do not rotate, so the only ways you can look around are to turn your mech or to move your line of vision within the cockpit. Mech movement is clunkier than veterans would expect — a joystick and throttle alone are not enough (I used a joystick and mouse) and the myriad keyboard bindings are very hard to remember. Mid-battle collisions and toe-to-toe tangos with enemies are much too common, but the enemy AI is quite well balanced.

Multiplayer mode suffers many of the same problems. While the network code for both games is topnotch and finding a game online is always easy, Tribes is a far better experience.

Anyone who has played the demos of MechWarrior 3 and Heavy Gear 2 will feel let down, but Starsiege's faults are not enough reason to dismiss it. The developers have put a lot of work into this one. If you like a good story and can't wait for your next mech fix, Starsiege is a sensible purchase.

Simon Vandore

| | |
|------------------|---|
| ■ Distributor | Wolf Interactive |
| ■ Phone | (02) 9417 9600 |
| ■ Online | http://www.starsiege.com/ |
| ■ Price | \$89.95 |
| ■ Requires | Pentium 200 (or Pentium 166 with 3D accelerator), Windows 95, 32M RAM, DirectX, 4x CD-ROM drive, Direct Draw-compatible SVGA card, Direct Sound- compatible soundcard |
| ■ Classification | M 15+ |
| ■ Rating | ★★★ |

Australian Cricket Captain

Is this game appealing? Well, sort of, but probably not to every gamer. Australian Cricket Captain (ACC) is a cricket strategy game that doesn't have the smash 'n' bash style of other cricket arcade games. The gameplay can be somewhat dry, boring and frustrating... but hey, that sums up the real game. For cricket addicts, ACC would be fun and challenging.

ACC gives you the opportunity to cap-

tain and manage an Australian cricket team. You start with one of the state sides playing in the domestic Shield and one-day matches before progressing to lead the national side. The gameplay can be set to ball-by-ball action or reduced to one over at a time or auto-result. Graphical highlights of the play can be viewed, but don't expect any stunning 3D effects. Commentary by Ian Chappell adds to the TV-style highlights.

All the current Australian first-class players are featured, and detailed ground conditions and player statistics will help you pick your team. If your side is batting, a captain doesn't have a lot of influence on the game and this is reflected in ACC. You can change the batting order and set the offensive and defensive levels of each batsman. But the moment you take the field to bowl is when the complexities of the game unfold. The captain must set fielding positions, change the line of attack,



make bowling changes, and decide when to attack or defend. You need to experiment to get the wickets; sitting back and relaxing will not win you any victories. But how realistic is the gameplay? Well, watching Glenn McGrath score 40-odd runs with the bat makes you wonder! Still, anything is possible.

ACC is an addictive strategy game for cricket enthusiasts searching for a touch of realism, but it doesn't set any new standards in graphics or gameplay.

Andrew Broadhead

| | |
|------------------|---|
| ■ Distributor | Metro Games |
| ■ Phone | (03) 9329 2999 |
| ■ Online | http://www.metrogames.com.au/ |
| ■ Price | \$79.95 |
| ■ Requires | 486 DX 66, Windows 95, 16M RAM, 2x CD-ROM drive, 1M video card, 130M hard disk space |
| ■ Classification | G |
| ■ Rating | ★★★ |



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There's more information about film on the Web than could ever possibly be necessary.

By Glenn Phillips

Big screen, small screen

Screen Network Australia

If you need to be reminded of the highlights of Guy Pearce's acting career before *Priscilla* or *LA Confidential*, then this site is for you. Screen Network Australia has a Great Moments on the Australian Screen page, which enlightens you to the fact that Guy Pearce was in *Home and Away* for two years after he left *Neighbours*.

Screen Network Australia is an online gateway to Australian film and television culture run by the Australian Film Commission, and is part of Australia's Cultural Network (ACN). However, SNA is not only about high culture: *Neighbours* is listed as a Great Moment alongside *Skippy*, *Jedda* and *Shine*, but strangely, the two Barry McKenzie films don't rate a mention.

The heart of SNA is a Web site directory which links to over 200 sites including fan clubs, reviewers, zines, journals, festivals, cinemas and industry groups. The directory uses three vertical frames, and the categories used aren't always logical. If you click on a category in the left-hand frame, the central frame opens with a list of subcategories. You can click on one of the subcategories to open a list of relevant external sites in the left-hand frame.

To find out more information about the Barry McKenzie films, Web File tried searching SNA, but had no luck. We had to go to the Reviews and Credits category, then Movie Databases, and then guess which external site would have the information we were after. The Internet Movie Database can always be relied upon, and it contained pages about both films — *The Adventures of Barry McKenzie* and *Barry McKenzie Holds His Own*. Did you know that Gough Whitlam appeared in

Holds His Own, which is where he dubbed Edna Everage a dame?

SNA also has a page dedicated to Australian films at the Cannes Film Festival 1999. There is some information on the festival, but it's mostly a collection of links to the official festival site, Australians at the festival and online news, including daily reports from the festival by Urban Cinefile's Andrew Urban.

SNA also has a diary, maintained by the editors of the *Independent Filmmakers Journal*, where you can search for screen events in your area. An upcoming Sydney screening of *Holds His Own*, promoted by its organisers as the first since 1982, was not listed. The SNA home page claims you can enter your own events, but there are no instructions on how to do this in the diary itself. An email address for diary updates is buried in the Credits page.

Despite these problems, Screen Network Australia is an excellent place to start looking for information about Australian film and television.

■ Online <http://www.sna.net.au/>
 ■ Rating ★★☆☆

Urban Cinefile

Urban Cinefile is Australia's premier film Web site, and last year won the *Australian Financial Review*/Telstra Internet award for best arts and entertainment site. It is edited by Andrew Urban, who is a journalist and the filmmaker behind *Front Up*, SBS TV's weekly program of spontaneous interviews with 'ordinary Australians'.

Cinefile, unlike Web File, does not use a star ratings system for its reviews, and each film is reviewed by about three critics. Instead of stars, Cinefile uses a 'critical count' system, which indicates how many favourable, unfavourable or mixed reviews the film has received. Publishing the reviews of several critics also provides readers with a number of perspectives before they decide whether or not they want to see a film. Regular Cinefile visitors no doubt come to choose favourite reviewers, in the same way as viewers of



SBS TV's *Movie Show* tend to side with the opinion of either Margaret or David.

Each review is accompanied by stills from the film, names of the cast and crew, links to the trailer and session times, and interviews by Cinefile staff. There are interviews with actors and directors, many of which appear while the film is still in production. For instance, there is an interview with Geoffrey Wright, the director of *Romper Stomper*, who is currently filming a \$US11 million teen horror movie called *Cherry Falls* in a small West Virginian town.

In the interview, Wright explains that he is directing the film because "any mainstream American film that ends in an orgy has got to be worth making". He also responds to the concerned parents who have protested against shooting "a puerile, tawdry, Z-grade horror film" in the town's high school by stating that "this genre is a little bit provocative to people over a certain age".

The frequently updated News page runs brief stories from the Australian and international scenes, and readers can suggest their own stories (although they have to make it past the 'newshound', which can sniff out publicity hype). During the Cannes Film Festival 1999, Urban sent daily 'postcards' from Cannes, describing the antics of the stars at the festival. A highlight of the festival, it seems, was when Jimeoin was tackled by security guards for attempting to enter a black-tie Almodovar screening in a white safari suit.

Readers can join Cinefile's Movie Club to receive regular updates from the site.



Building on the urban theme, the membership form assumes members live in one of the capital cities or overseas — there is no rural option. Urban Cinefile's only other design problem is its lack of a search function.

■ Online <http://www.urbancinefile.com.au/>
 ■ Rating ★★☆☆

National Film and Sound Archive

Among the uninspiring public architecture of Canberra, the art deco building which houses the National Film and Sound Archive is memorable, especially for the native animal motifs on its walls. Formerly the Institute of Anatomy, the building is believed by many Canberrans to be haunted, although the Australian Skeptics have attempted to clear its name of these charges. The National Archive's Web site, however, is not quite so exciting and fails to match up to the grandeur of the building or the volume of material held within.

The National Archive has an extensive collection of Australian television shows, films, newsreels, home movies, radio broadcasts and music, but this is not evident from the Web site. There are no RealMedia or similar files on the site to give you a taste of the National Archive's collections, so if you want to view a newsreel of the opening of the Sydney Harbour Bridge you're out of luck.

The catalogue of the National Archive's collections was not yet online when Web File visited, although instructions for using it were. It can also be ordered on CD-ROM from the online shop. Many feature films and other titles can be borrowed from the National Archive for research or screenings, but the site does not make its lending policies and charges clear, and because the catalogue is not online it is difficult to know whether the Barry McKenzie films are available for loan.

Surfbaud: Phantom murmurs

Ever since George Lucas announced he was about to begin filming the Star Wars prequels, the Web has been host to rumours, speculation and nonsense about the trilogy. Keen Star Wars fans attempted to predict Episode I's plot from whatever information they could find, or guess the movie's name. Although *The Phantom Menace* is now showing in Australia, the speculation continues.

The current focus is guessing which actor will play Anakin Skywalker (aka Darth Vader) in Episodes II and III.

Dark Horizons, a film site run by 21-year-old Australian Garth Franklin, regularly posts news and rumours from the film world. Although James van der Beek and Ryan Phillippe have been mentioned as possibilities by Franklin's informants, one snout

known as 'Darth Squeeb' said "A friend at [Industrial Light and Magic] said 'Leonardo DiCaprio was seen at Skywalker Ranch yesterday walking with George Lucas and Rick McCallum'."

The same rumour was reported on Ain't It Cool News, a film Web site based in the US. Each news item has a space where visitors can respond, and few seem to be pleased by the rumour. 'Wes' believes that "He can't act . . . almost every male alive hates Leo's guts . . . and, he doesn't even look a thing like Anakin." Vaclav Varada disagrees: "Now teenage girls and sci-fi geeks will unite and easily make SW2 the highest grosser ever."

If you are sick of the hype surrounding everything Star Wars, then surf over to Mr Cranky, where the film

reviews have a refreshingly cynical perspective. Movies are rated with one to four bombs, although the very worst movies get a stick of dynamite. After seeing *The Phantom Menace*'s preview, Mr Cranky awarded it two bombs and said we should be worried, because "seething mobs of geeks at the film's opening are likely to set new theatre records for random shrieking, inappropriate laughter and mistimed applause."

The review of the film itself is scathing. "Originally," Mr Cranky writes, "Luke used 'the Force' to learn to believe in himself and the superiority of natural intuition over technology . . . Now, Jedi Knight Qui-Gon Jinn talks about 'the Force' like he's giving a speech on personal

improvement on Oprah . . . 'the Force' now refers to this film's marketing campaign and little else. It's certainly not the philosophy it once was to George Lucas, who's populated the film with so many computer-created characters it's hard to tell whether you're watching a movie or a Toys 'R' Us commercial."

There is also a Mr Cranky forum where readers can respond to reviews — one member quotes the DiCaprio rumour with delight.

Glenn Phillips

Dark Horizons

<http://www.darkhorizons.com/>

Ain't It Cool News

<http://www.aint-it-cool-news.com/>

Mr Cranky

<http://www.mrcranky.com/>



The site is of most value to Canberra film buffs, who can see what's coming up at the National Archive's weekly screenings. Residents of other cities and regional centres can find out when a travelling exhibition is next coming through their area. An exhibition of the early Australian writer/director Charles Chauvel is currently touring the country with films such as *In the Wake of the Bounty* and *Jedda*.

The online shop is also a valuable resource. The National Archive produces its own video compilations from its collection, on themes such as women in silent films, historic advertisements, 20th-

century Australian culture and yodelling. There are also CD compilations featuring Australian radio quiz shows and radio dramas. There is no secure online ordering form, but you can send your credit card details via email if you find something of interest. A number of Australian feature films are also available on video, so if you happen to be looking for a copy of the film that launched Nicole Kidman's career, *BMX Bandits*, you can find it here.

■ Online <http://www.nfsa.gov.au/>
 ■ Rating ★★☆☆



Hewlett-Packard's head honcho reveals the secrets of business success and cattle ranching.

Chip Chat

Like many impartial industry observers with too much time on their hands, Chip Chat has been spending some time recently reflecting on the future of Hewlett-Packard. For those of you with short memories or real jobs, Hewlett-Packard announced in early March that it was going to split in two, floating its test and measurement division as a separate company and focusing the leftovers exclusively on computer-related tasks, such as working out what to do with Windows 2000 in the real world.

The process of division has started, but is expected to take up to a year to complete. Based on the industry's general ability to meet deadlines, this could mean 2003, but Chip Chat didn't want to wait that long for the inside scoop on how the company might change and evolve.

Rather than doing any of the obvious things, though, such as asking an Hewlett-Packard corporate spokesperson, talking to Wall Street brokers, or ringing up a psychic hotline, Chip Chat came up with a different plan: reading *The HP Way*, company co-founder David Packard's account of how Hewlett-Packard got started and got big, and looking for clues. *The HP Way* was ranked by Amazon.com readers as their favourite business book of 1996, but Chip Chat picked it up for \$2 in a remainder bookstore.

Deer, steers and rears

At the outset, it has to be said that the odds were stacked against this endeavour as an investigative task. To put it bluntly, *The HP Way* is not the world's most fascinating book. One online reviewer said that the first section of the book was a "positive cure for sleeplessness". Chip Chat thinks that might be a little generous. Mind you, the opening lines could have come from a romance novel:

In the fall of 1930 I left my hometown of Pueblo, Colorado, to enrol at Stanford University. There I met another freshman, Bill Hewlett.

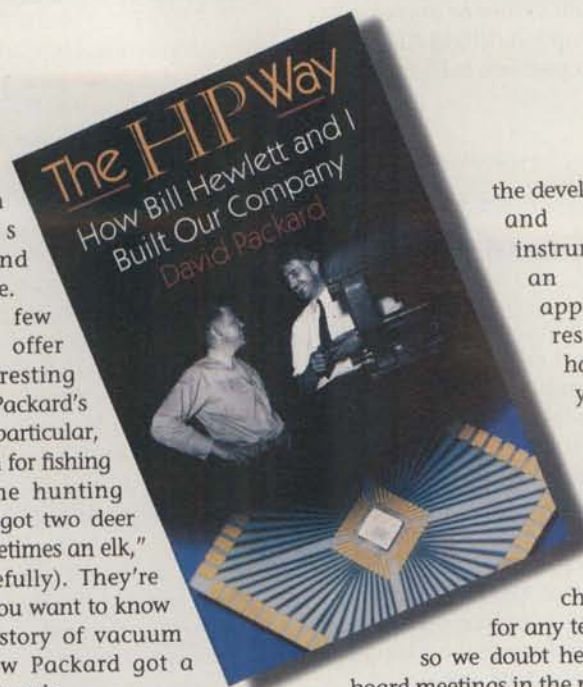
However, rather than running off to San Francisco, the two men formed a

company in Packard's garage — and made a fortune.

The first few chapters do offer some interesting insights into Packard's private life: in particular, his fascination for fishing and big game hunting ("We always got two deer each and sometimes an elk," he notes gleefully). They're also great if you want to know about the history of vacuum tubes, or how Packard got a distorted left thumb.

What Chip Chat wanted to know, though, was how Packard would feel about the proposed split. In fiscal terms, testing and measurement is Hewlett-Packard's midget these days, accounting for just 16% of revenues. But does he see it that way?

Well, no. Far more space is devoted to



the development of testing and measurement instruments than PCs, an area Packard appears to quietly resent because it's hard to differentiate your product on purely technical grounds.

However, Packard also (reluctantly) notes that change is essential for any technical company, so we doubt he'll be firebombing board meetings in the months ahead.

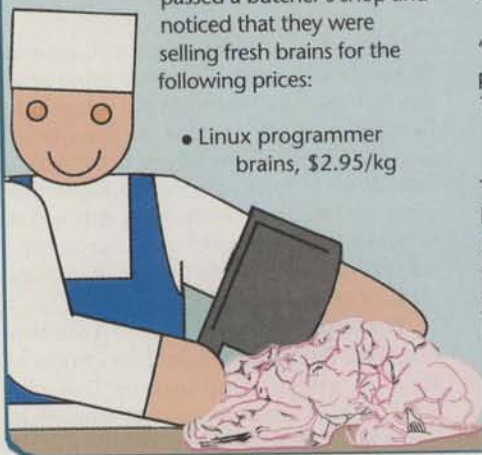
As a final item for your list of tips that no CEO should ignore, *The HP Way* also features the following handy hint about cattle ranching: "I found, after much trial and error, that applying steady, gentle pressure from the rear worked best." We'd make a smutty gag about this, but we've run out of room.

Contest: Technology gag of the month

There are not many words in the English language that rhyme with 'laugh'. Half. Calf. Staff. Barf. This must mean something. Suggestions are welcome. This month's winner comes from Wayne Munce:

While walking through Seattle recently, I passed a butcher's shop and noticed that they were selling fresh brains for the following prices:

- Linux programmer brains, \$2.95/kg



- Mac OS programmer brains, \$4.95/kg
- Windows NT programmer brains, \$24.95/kg

I was astounded and walked inside to ask the butcher the obvious question: "Why are the NT programmers' brains so expensive?"

The butcher replied very calmly: "Do you realise how many NT programmers we have to use just to get 1kg of brains?"

We'll be sending Wayne an Interim Technology polo shirt, a program called Brick IT and a rather lame badge from Sun. You too can gag along with the Chip Chat team. Send your technology jokes — the shorter and funnier the better — to chipchat@acp.com.au. If we publish your joke, you'll win specially selected items from the APC prize cupboard.

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